DECEMBER 1940 Thirty-Five Cents Per Copy

Coal Age

Volume 45 Number 12

Mechanical loading records continued improvements, as backward glances over the past fifteen years of operation will show. Former theoretical productions have become actual and they, in turn, are now projected toward greater output per man for still lower costs per ton. Ed. Johnson, who has closely followed these changes since early loading-machine applications, definitely pegs many of the now simple procedures of underground mechanical routine and measures economies of time and money in one specific instance, p. 53. . . . **And "what it takes"** to supervise a mechanized mine was thoroughly discussed at the Lowther Mining Institute meeting, to make interesting reading for foremen, superintendents and all concerned, on p. 85. . . . **Modernization** of an old mine in the Kanawha field, with its resulting "comeback," will be told in an early issue by Roger W. Tompkins, president, Cedar Grove, Inc. Producing 10½ tons per man-shift, hand-loading into room conveyors in 34-in. coal, is not only a comeback for the mine but is a long stride toward a record for such work. . . . **Iowa and Missouri** are doing things, too. Scandia Coal Co. of Des Moines is operating

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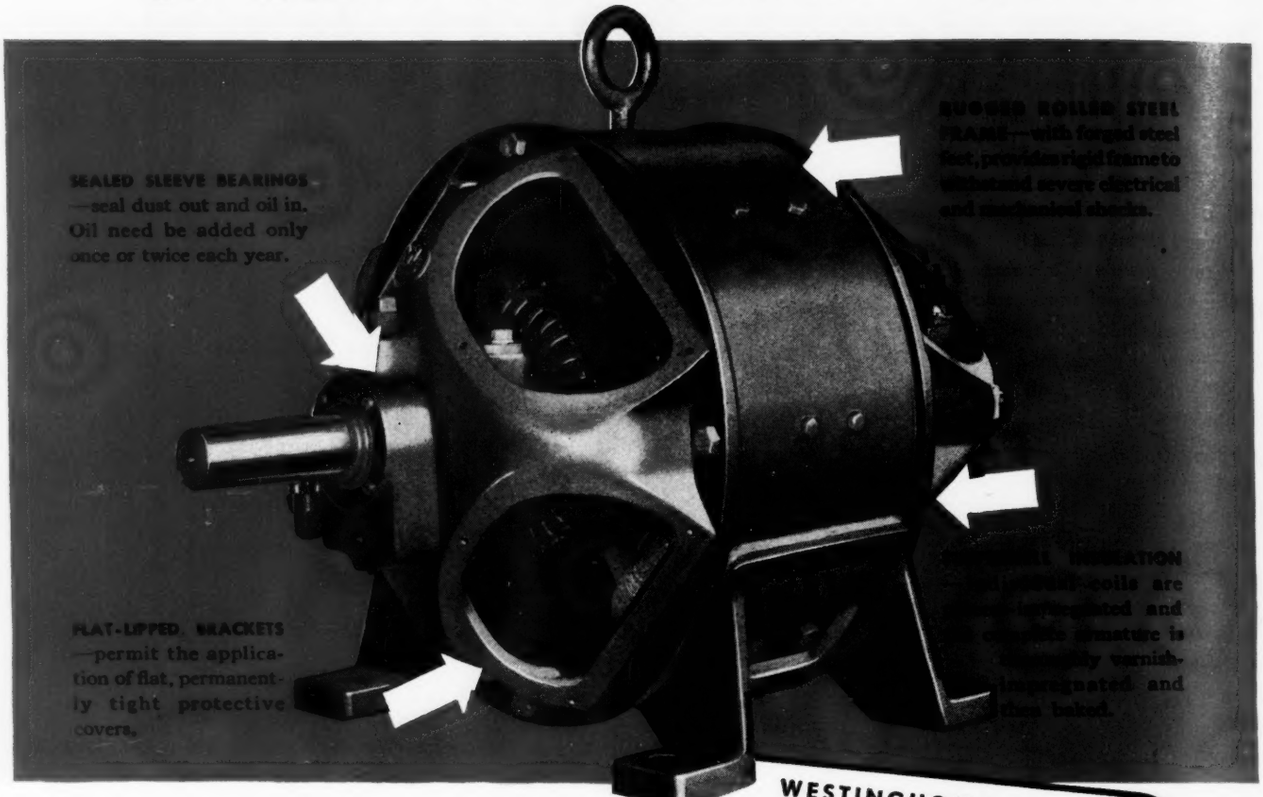
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Westinghouse SK Mining Motors

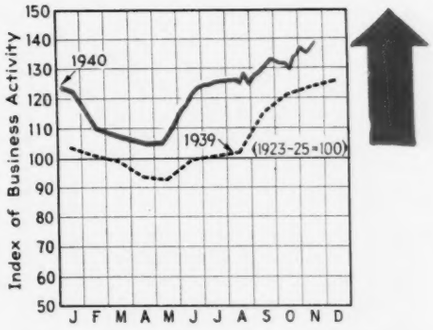
(CONTINUED FROM PAGE 5)

conveyors in its Madrid mine and has worked out a roof-control system which delays the troublesome squeezes formerly occurring under old methods, p. 55, while the 100-per-cent truck strip mine of Marriott-Reed Coal Co., near Columbia, Mo., has raised its daily capacity 300 per cent in three years' time, p. 67. Both these properties use up-to-the-minute equipment and practices. . . . **Tennessee** will soon contribute a record of achievement with self-loading conveyors in a 33-in. seam. George Henderson, superintendent, High Point Coal Co., has written the story of his increased production under difficult conditions, for early publication in Coal Age. . . . **The new mine** of the Wise Coal & Coke Co. at Dorchester, Va., is described in this issue, p. 47. Opened by a rock tunnel a quarter mile long, the Norton seam, which here averages about 36 in. in thickness, is mined with modern equipment and gives an average production of 10 tons per man-shift delivered to the tipple. Maps and photographs fully illustrate the article. . . . **Annual Review and Progress Number,** Coal Age's 30th, is being planned for February, as usual. The year 1940 has recorded many advances along many operating fronts of the industry which this forthcoming issue of Coal Age will detail. . . . **Front cover space** this month was released for editorial use by Hulburt Oil & Grease Co., whose advertisement occupied that spot last December.

HOW'S BUSINESS

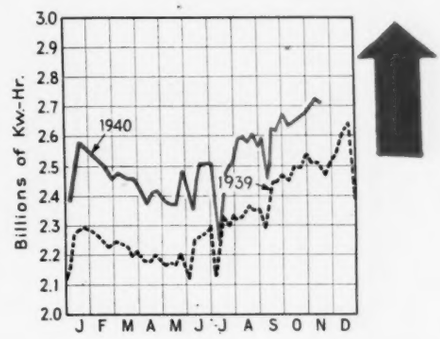
GENERAL BUSINESS CONDITIONS

Spurting sharply, *Business Week* Index reached a new high of 139.6, it stated on Nov. 16. This compares with 137.8 in the preceding week and 134.4 a month previous. The upward movement is attributed to awarding of heavy engineering contracts under prod of the defense program. Both residential and industrial building are at the best rate since 1929, with demand for additional plant capacity and homes for more workers.



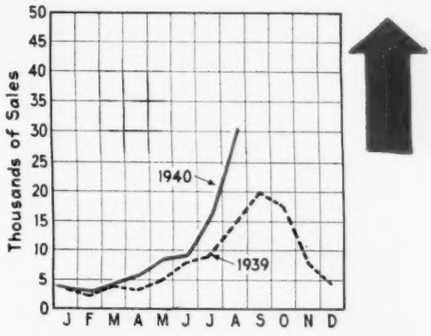
ELECTRICAL POWER OUTPUT

Output of electric energy by the electric light and power industry, according to the Edison Electric Institute, reached a new all-time high of 2,734,402,000 kw.-hr. for the week ended Nov. 2. receding in the following week to 2,719,501,000 kw.-hr., the latter, however, maintaining an 8.2 per cent lead over the corresponding week of last year. For the week ended Oct. 12. the first following our last report, output was 2,665,000,000 kw.-hr.; Oct. 19. 2,687,000,000; Oct. 26, 2,711,000,000 kw.-hr.



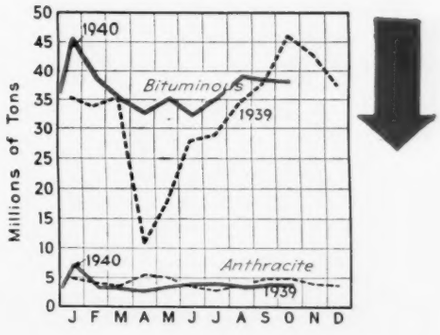
COAL STOKER SALES

Mechanical stoker sales in the United States in September last totaled 31,337 units (U. S. Bureau of the Census from 107 manufacturers), compared with 23,469 in the preceding month and 20,600 in September, 1939. Sales of small units in September last were: Class 1 (under 61 lb. of coal per hour), 28,076 (bituminous, 25,992; anthracite, 2,084); Class 2 (61-100 lb. per hour), 1,802 (bituminous, 1,303; anthracite, 499); Class 3 (101-300 lb. per hour), 1,073.



COAL PRODUCTION

Bituminous coal produced by United States mines in October last (preliminary) totaled 38,300,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior, which compares with 38,650,000 tons in the preceding month and 46,394,000 tons in October, 1939. Anthracite tonnage in October last was 4,234,000 (preliminary), according to the U. S. Bureau of Mines, against 4,056,000 (revised) in the preceding month and 4,985,000 tons in October, 1939.



Fifteen Years' Experience B
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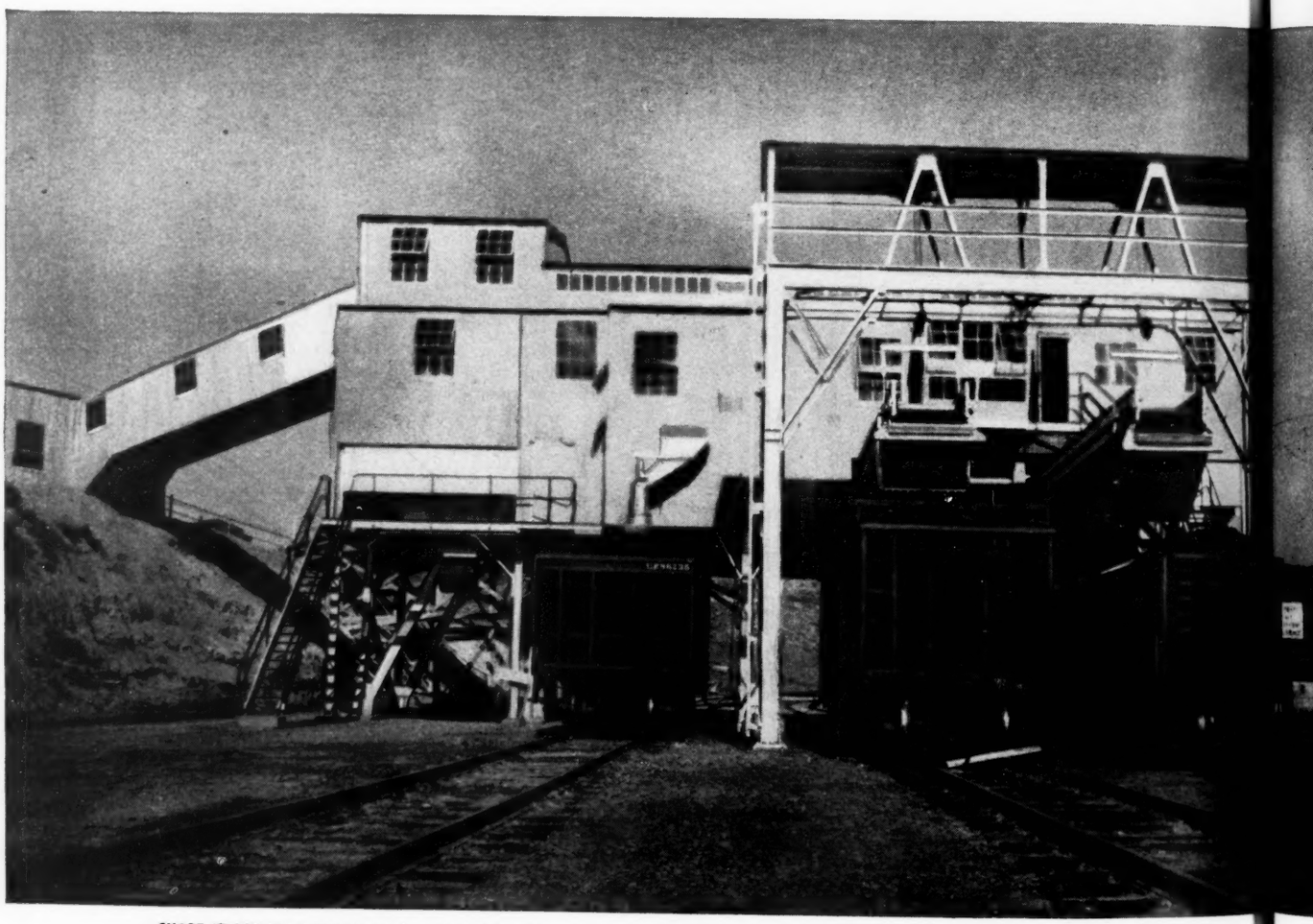

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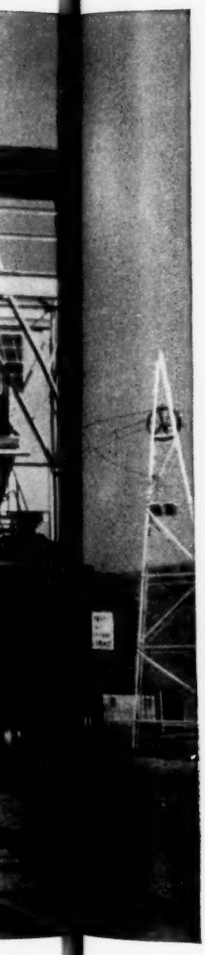

DESIGNED for "streamlined" handling of coal, this up-to-date western mine* assures minimum power consumption and long, trouble-free life of equipment through the use of Texaco Lubricants.

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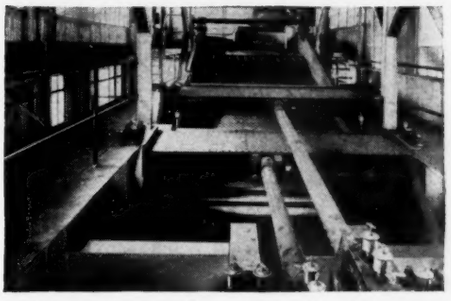

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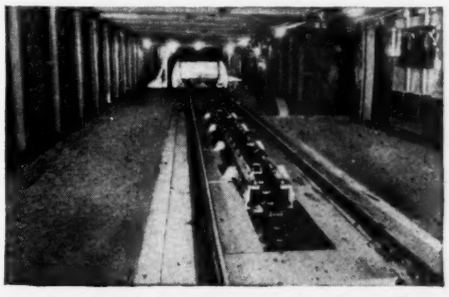

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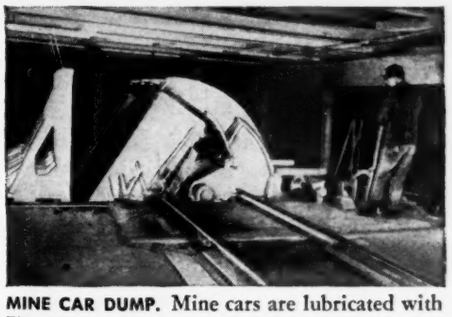

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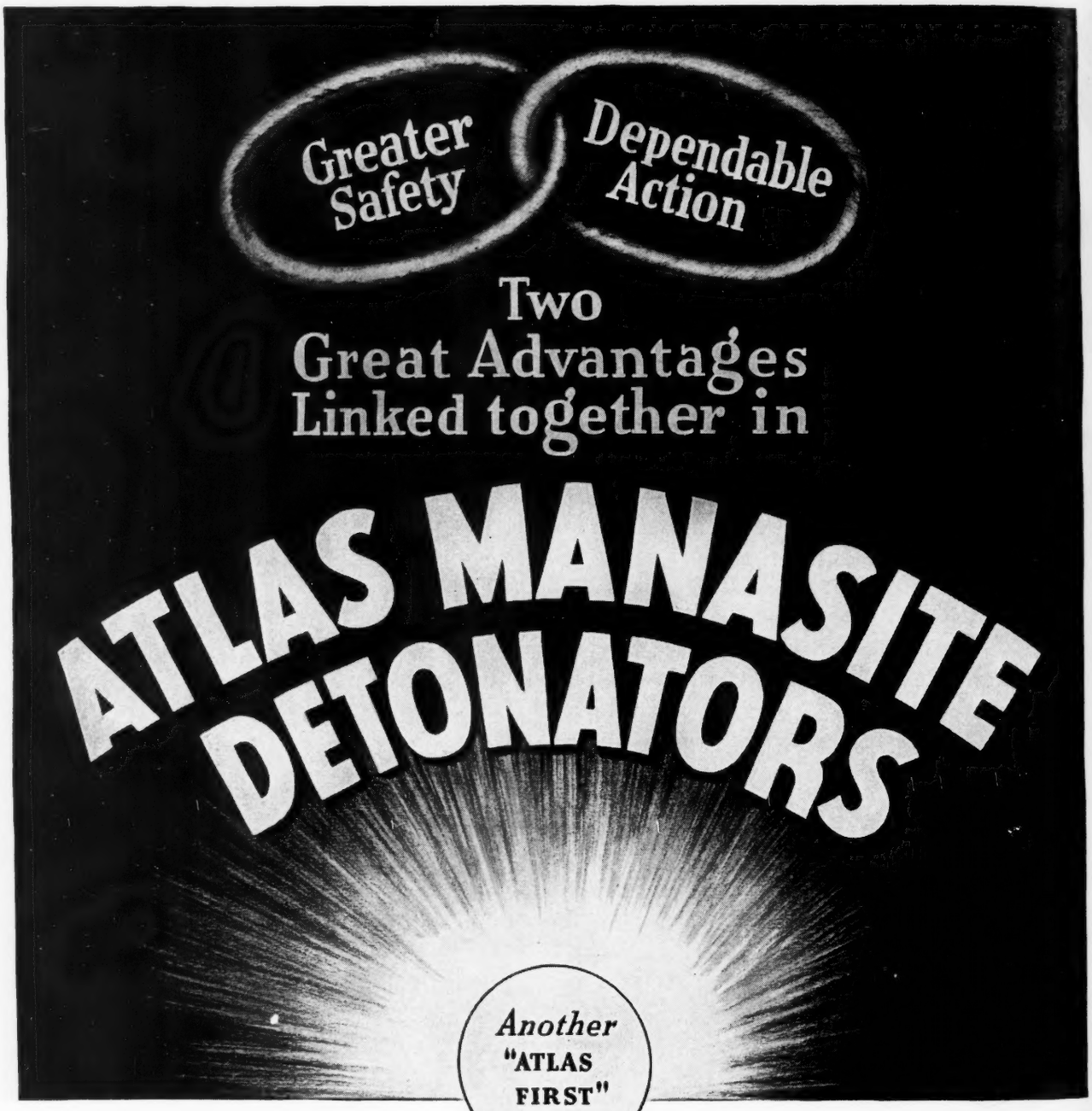

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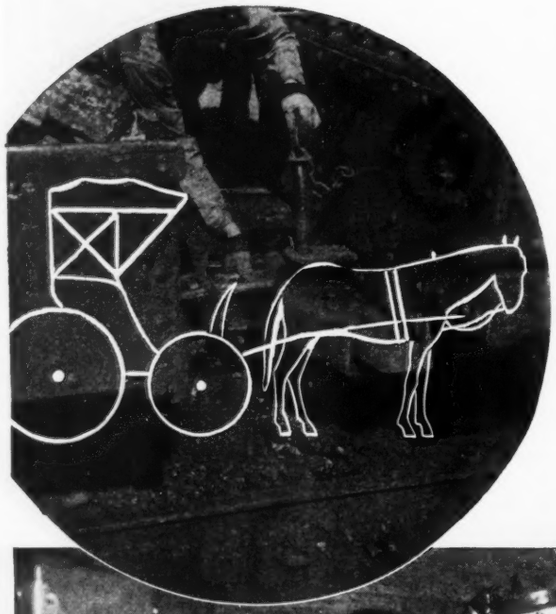

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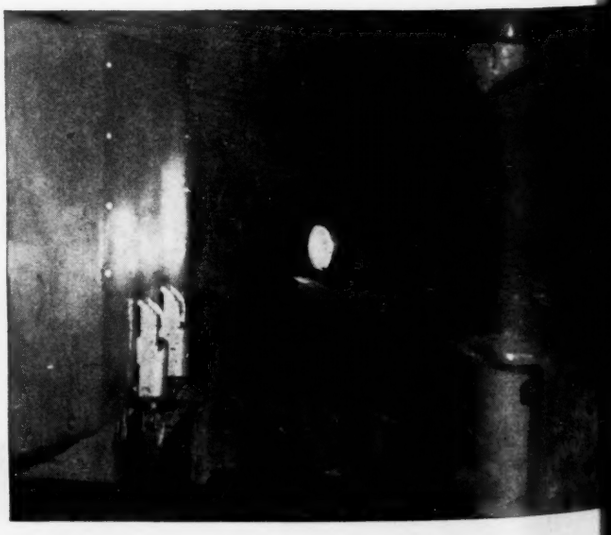

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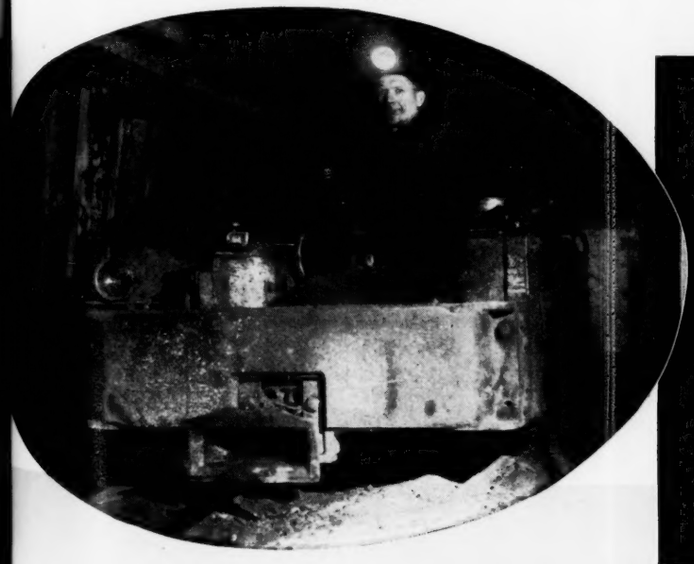

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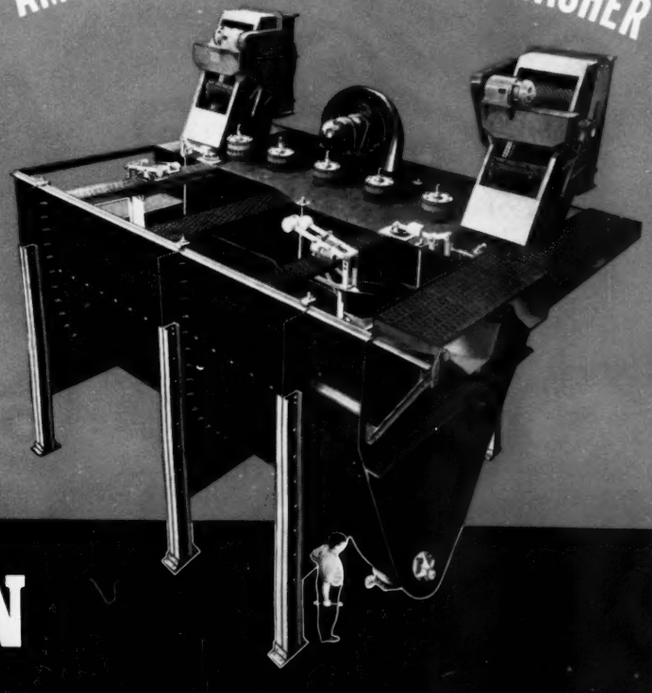

This new modern washing plant, just completed by McNally-Pittsburg at Staunton, Indiana, will enable the Ayrshire Patoka Collieries Corporation to provide its market with a uniform washed output of premium coal. The new McNally-Pittsburg washery has a capacity of 400 tph. The entire run-of-mine output is broken to six inches and washed in two McNally-Norton washers, one of which is a newly patented compound unit. The compound washer has an auxiliary wash unit for treating crushed middlings from both boxes. Six sizes can be washed and mixed in any possible combination for loading on four tracks.

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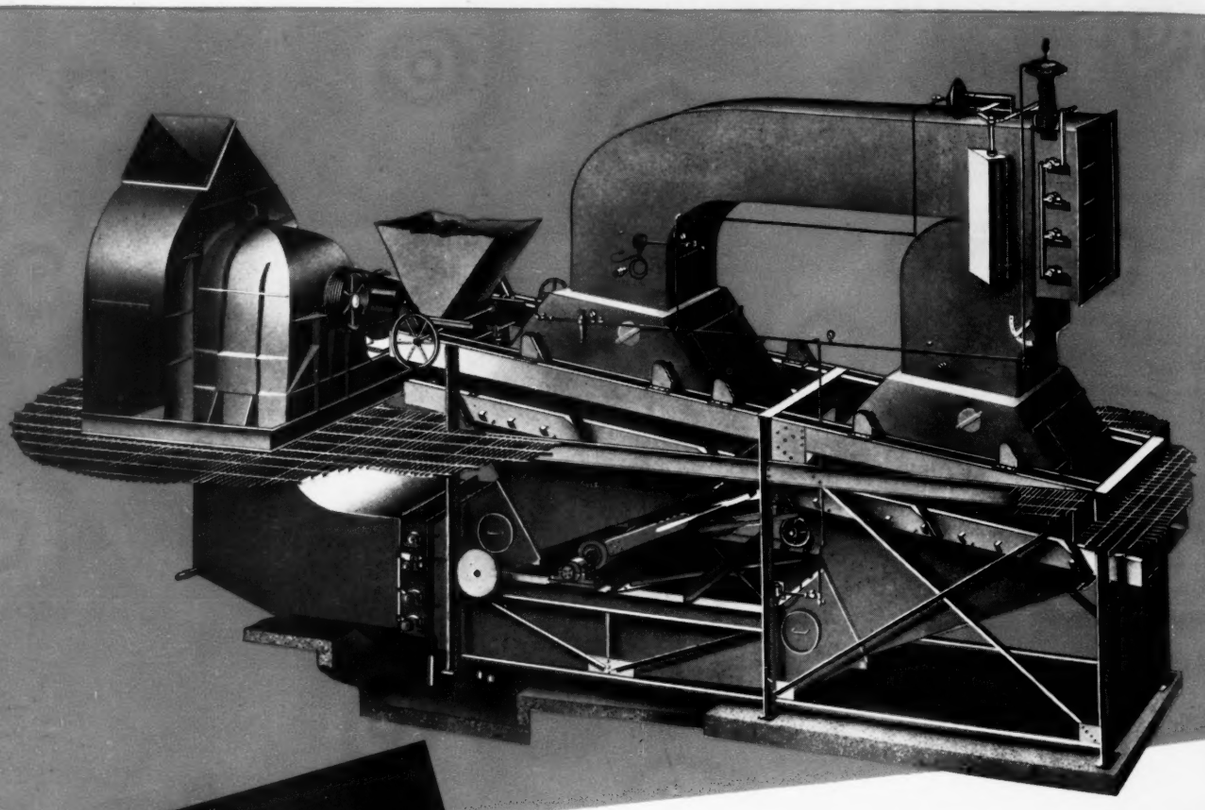

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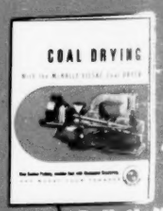
50 To 100 TPH Per Unit
High capacities are made possible by the patented Pulsator action.



Send for Bulletin No. 940

McNALLY-VISSAC COAL DRYER

McNALLY-PITTSBURG MFG. CORP.

General Sales Office, 307 N. Michigan Ave., Chicago • Main Office and Works, Pittsburg, Kansas

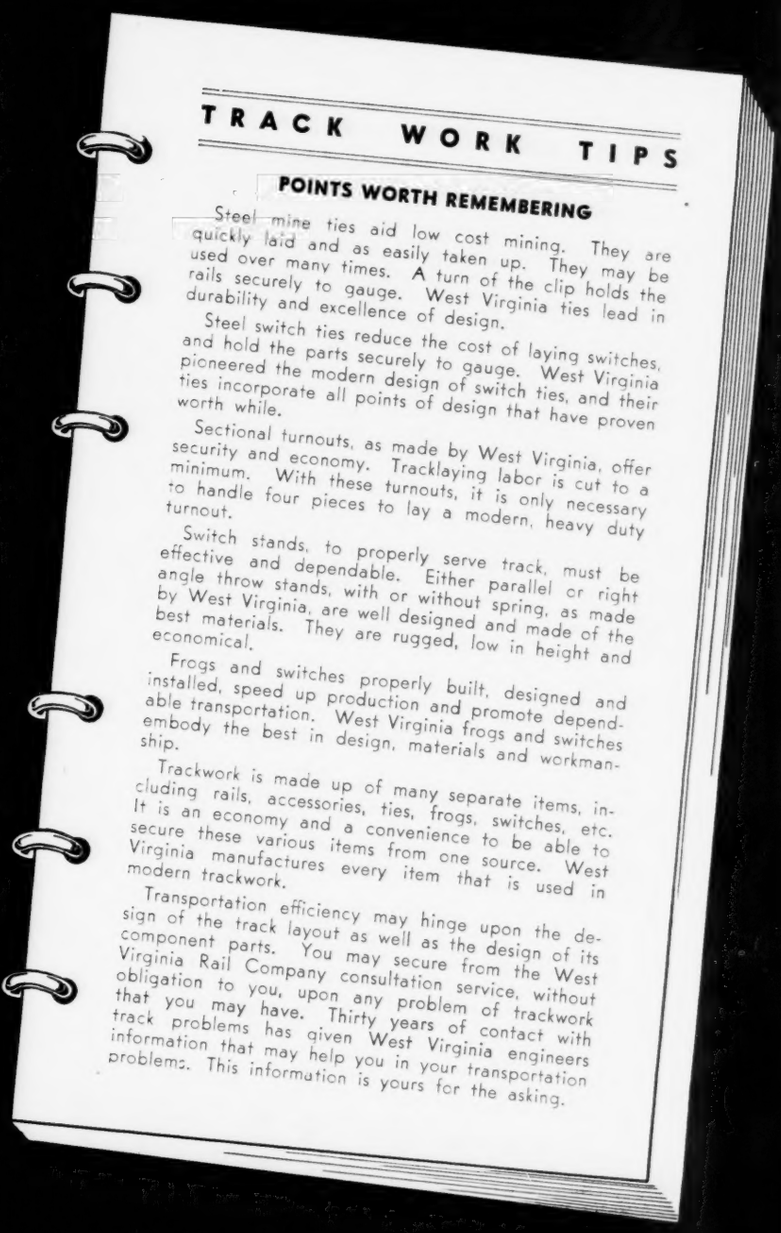
WEST VIRGINIA TRACK EQUIPMENT

Plus Improved Track Work Practice

... A COMBINATION THAT ASSURES YOU MAXIMUM ECONOMY AND EFFICIENCY

When you buy West Virginia track work, you get the best, but even the best materials need correct installation to give good service.

West Virginia engineers with years of wide experience are well qualified to assist you in correct planning and installation of your track work. They are glad to present "track work tips" that may be helpful, but even more helpful in your quest for efficient standardized track work would be an obligation-free consultation with them.


TRACK WORK TIPS
POINTS WORTH REMEMBERING
Steel mine ties aid low cost mining. They are quickly laid and as easily taken up. They may be used over many times. A turn of the clip holds the rails securely to gauge. West Virginia ties lead in durability and excellence of design.
Steel switch ties reduce the cost of laying switches, and hold the parts securely to gauge. West Virginia pioneered the modern design of switch ties, and their ties incorporate all points of design that have proven worth while.
Sectional turnouts, as made by West Virginia, offer security and economy. Tracklaying labor is cut to a minimum. With these turnouts, it is only necessary to handle four pieces to lay a modern, heavy duty turnout.
Switch stands, to properly serve track, must be effective and dependable. Either parallel or right angle throw stands, with or without spring, as made by West Virginia, are well designed and made of the best materials. They are rugged, low in height and economical.
Frogs and switches properly built, designed and installed, speed up production and promote dependable transportation. West Virginia frogs and switches embody the best in design, materials and workmanship.
Trackwork is made up of many separate items, including rails, accessories, ties, frogs, switches, etc. It is an economy and a convenience to be able to secure these various items from one source. West Virginia manufactures every item that is used in modern trackwork.
Transportation efficiency may hinge upon the design of the track layout as well as the design of its component parts. You may secure from the West Virginia Rail Company consultation service, without obligation to you, upon any problem of trackwork that you may have. Thirty years of contact with track problems has given West Virginia engineers information that may help you in your transportation problems. This information is yours for the asking.

EVERYTHING IN TRACK WORK

RAILS AND ACCESSORIES
FROGS AND SWITCHES
SWITCH STANDS
SWITCH TIES
CROSSOVERS
STEEL TIES

THE WEST VIRGINIA RAIL CO.

HUNTINGTON WEST VIRGINIA

"To make money in m... z"

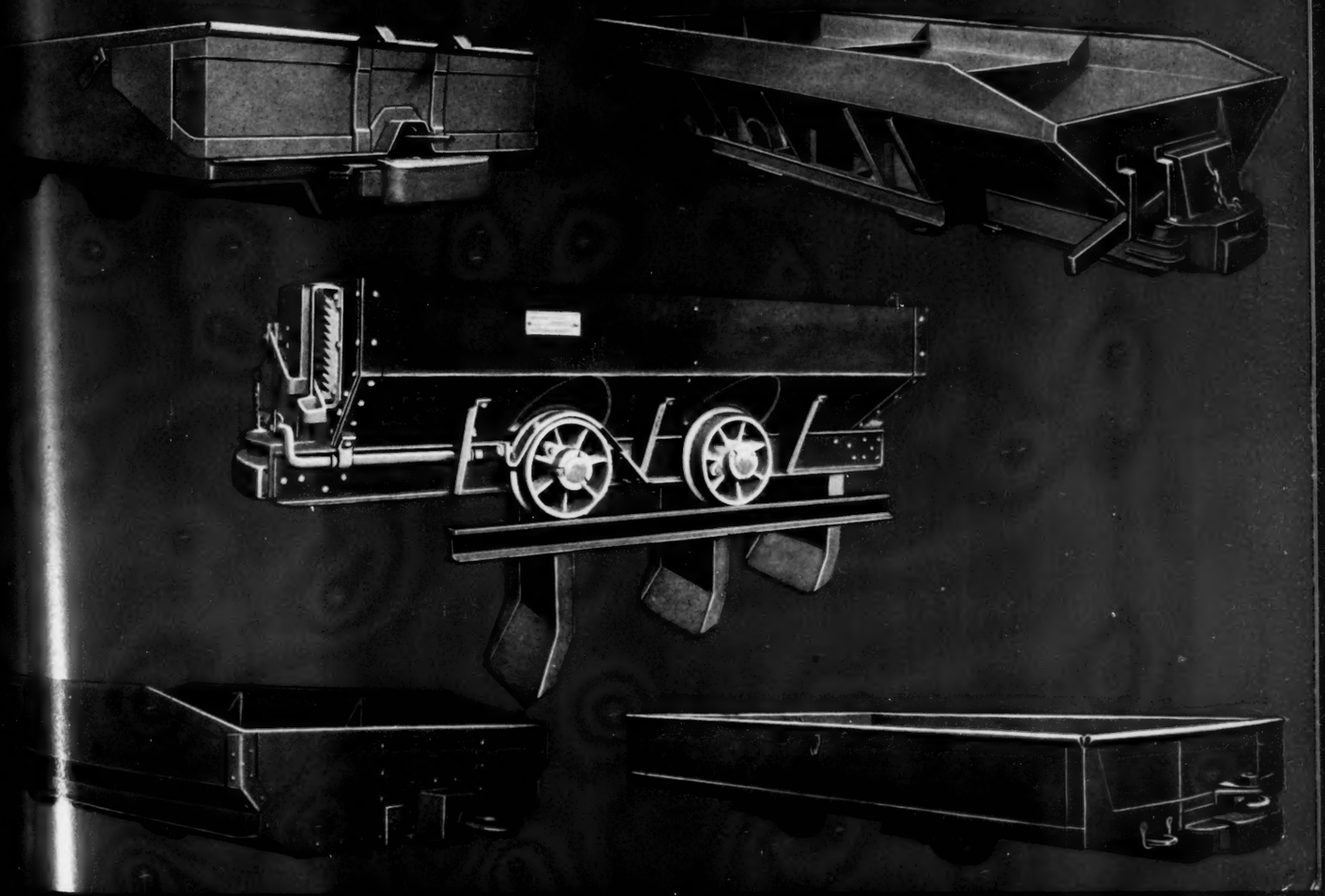
one experienced coal mining executive said, "I've got to have larger and most modern cars" ... Yes, mine cars and wheels basically influence profits in many mines — that is why so many operators buy from a.c.f. ... They know that a.c.f. designs have utmost capacity, regardless of the type of mine car. And they know that a.c.f. prices are low, because a.c.f. cars

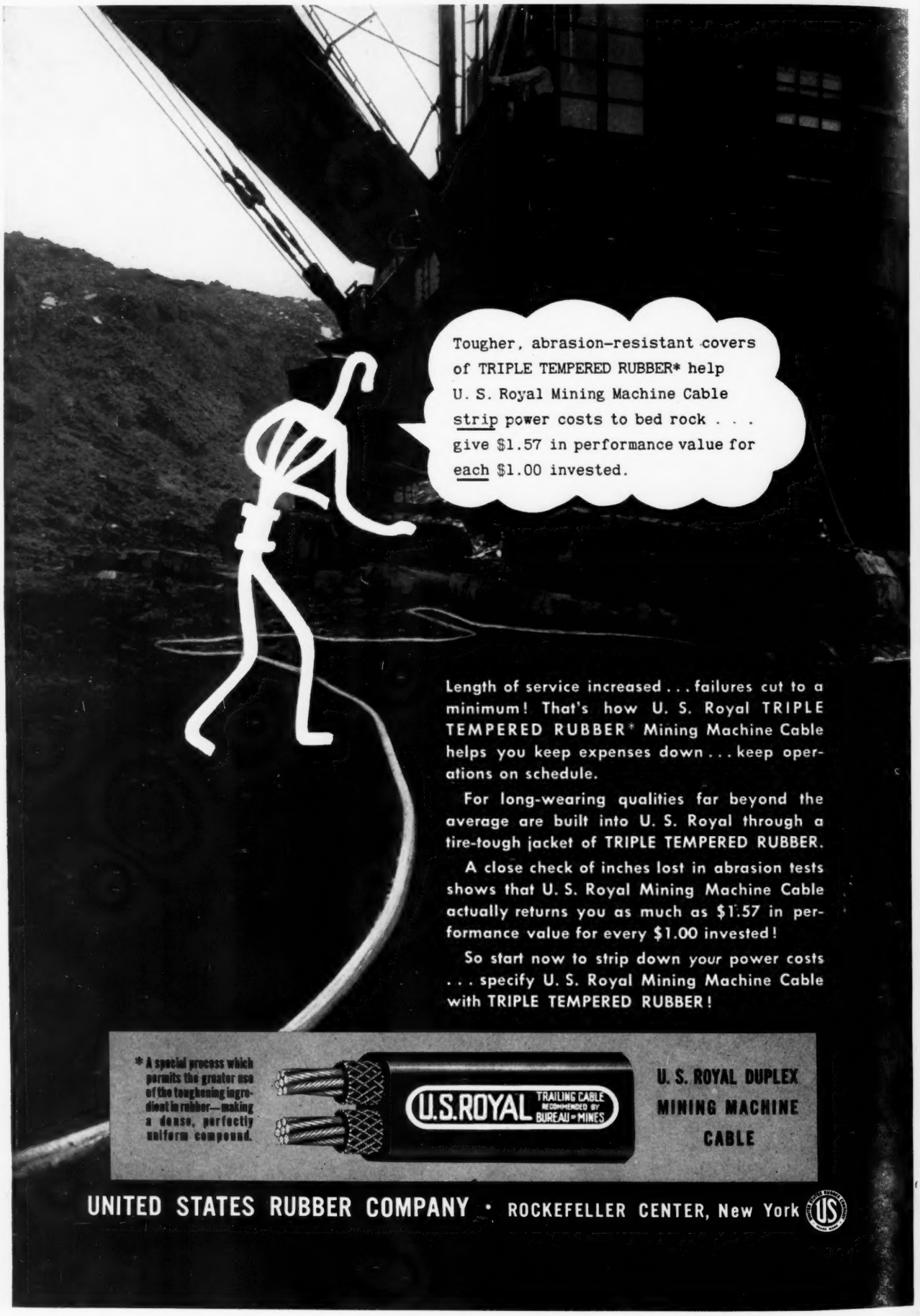
are made on a quantity production basis — and because of the money-making service these cars render . . . We make many different designs of cars for all districts, and will be pleased to work with you regarding the best car for your job.

AMERICAN CAR AND FOUNDRY COMPANY

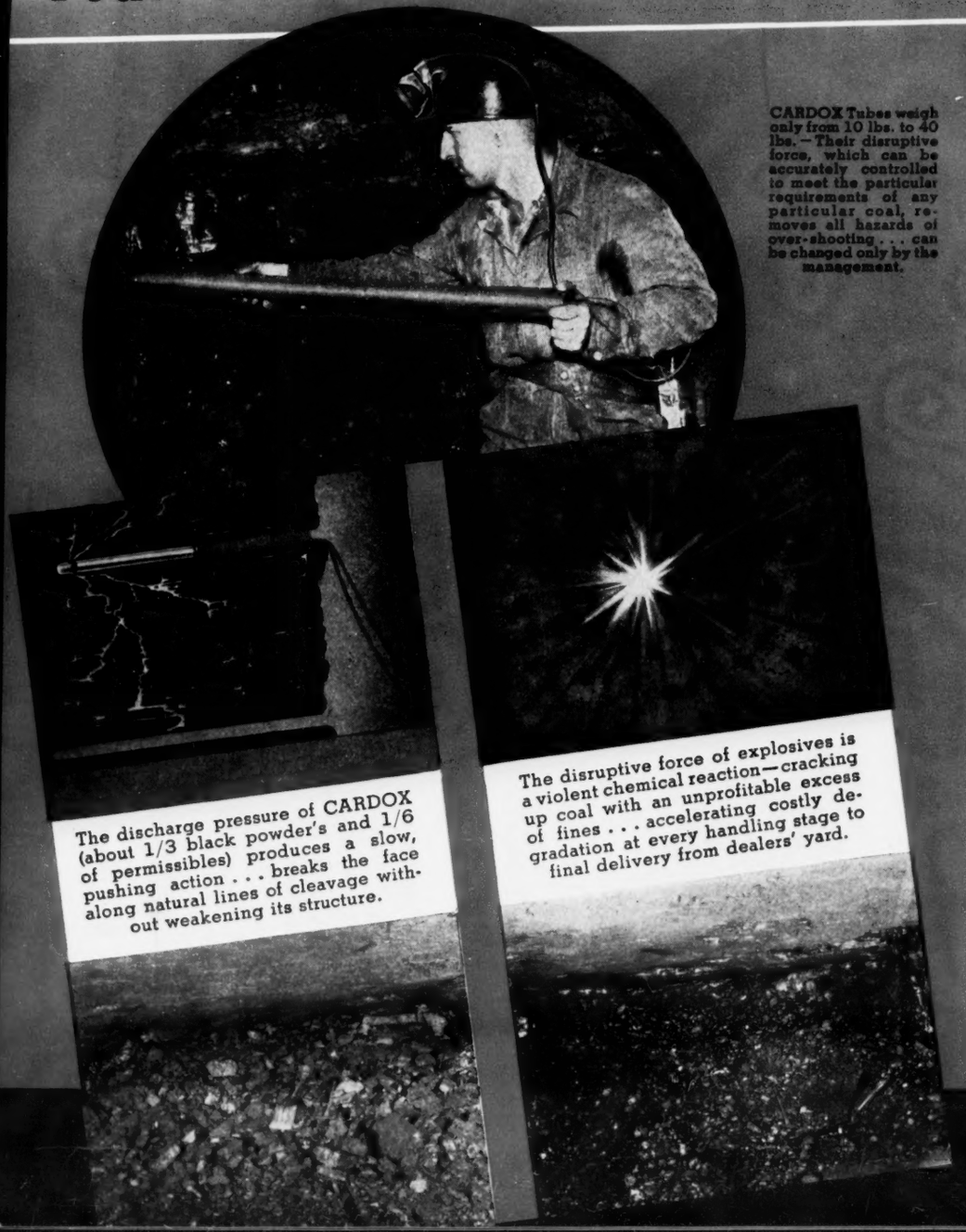
New York • St. Louis • Chicago • Philadelphia • Berwick, Pa.
Pittsburgh, • Cleveland • Huntington, W. Va.

acf acf acf acf acf acf




Tougher, abrasion-resistant covers of TRIPLE TEMPERED RUBBER* help U. S. Royal Mining Machine Cable strip power costs to bed rock . . . give $1.57 in performance value for each $1.00 invested.
Length of service increased . . . failures cut to a minimum! That's how U. S. Royal TRIPLE TEMPERED RUBBER* Mining Machine Cable helps you keep expenses down . . . keep operations on schedule.
For long-wearing qualities far beyond the average are built into U. S. Royal through a tire-tough jacket of TRIPLE TEMPERED RUBBER.
A close check of inches lost in abrasion tests shows that U. S. Royal Mining Machine Cable actually returns you as much as $1.57 in performance value for every $1.00 invested!
So start now to strip down your power costs . . . specify U. S. Royal Mining Machine Cable with TRIPLE TEMPERED RUBBER!
* A special process which permits the greater use of the toughening ingredient in rubber—making a dense, perfectly uniform compound.
U.S.ROYAL TRAILING CABLE RECOMMENDED BY BUREAU OF MINES
U. S. ROYAL DUPLEX MINING MACHINE CABLE
UNITED STATES RUBBER COMPANY · ROCKEFELLER CENTER, New York
US

Your Coal is Better than It is CRACKED UP to be



CARDOX Tubes weigh only from 10 lbs. to 40 lbs.—Their disruptive force, which can be accurately controlled to meet the particular requirements of any particular coal, removes all hazards of over-shooting . . . can be changed only by the management.

The discharge pressure of CARDOX (about 1/3 black powder's and 1/6 of permissibles) produces a slow, pushing action . . . breaks the face along natural lines of cleavage without weakening its structure.

The disruptive force of explosives is a violent chemical reaction—cracking up coal with an unprofitable excess of fines . . . accelerating costly degradation at every handling stage to final delivery from dealers' yard.

STOP SHATTER-CRACKS with CARDOX

● Most coal is inherently firm and blocky. But to get it to market in that condition, requires a method of breaking it down that won't crack it up.

CARDOX replaces the sharp, quick, shattering blow of explosives with the gentle heaving action of expanding, smokeless, flameless carbon dioxide. Its slow, steady push breaks the face along its natural lines of cleavage . . . producing a maximum of coarse sizes that remain coarse sizes during extensive mechanical handling, long, rough hauls by train, boat or truck, as well as dealer-yard weathering and loading hazards.

CARDOX makes possible production efficiencies and economies that match its protection of coal structure in profit-increasing possibilities. It makes possible the use of a longer cutter bar . . . rolls the coal forward for much faster mechanical loading . . . permits working crews to enter working faces immediately after the fall . . . guards against the losses of overshooting . . . lowers timbering costs . . . reduces fire, explosion and other mining hazards. In numerous mines, CARDOX-made production economies and realization increases have actually meant the difference between profit and loss.

"Since adopting CARDOX, we have increased our prepared sizes over 1¼" screen 4%, which we feel is excellent since three-fourths of our tonnage comes from pillars. CARDOX has also increased our tonnage, since we do not have to wait for smoke to clear up."

"The use of CARDOX has enabled us to increase the width of our rooms from 24' to 30' . . . and the depth of our undercut from 6' to 8'. CARDOX also permits us to shoot on shift since it generates no objectionable fumes . . . and its use has doubled our 6" lump, while decreasing our 1¼" screenings by eight percent of the total output."

"We have found that CARDOX leaves us a firmer top, as well as firm, straight ribs. It has proved a real asset in stepping up the production of our mechanical loaders. Degradation is cut to a minimum . . . and the hard, firm structure coal has gained us many satisfied customers."

"We immediately learned that with CARDOX we could lengthen our undercut from 6½' to 9'; thereby increasing face tonnage 30%. The coarse sizes produced with CARDOX are of a more firm and blocky structure. They withstand shipping with minimum degradation and also make a better coal for storing."

Write or Wire Today
FOR A FREE TEST AT YOUR MINE

CARDOX CORPORATION
BELL BUILDING, CHICAGO

TO ALL COAL

If it's Trailer Transportation you're interested in, you should know everything about Trailers

Judge the trailers you plan to purchase by comparison of facts. Surely, this is the only way you can possibly know which trailer is best suited for your needs . . . which one will pay the biggest dividends. We want you to stack S-D Automatic Trailer performance beside that of other makes. Then, you'll find out just what the automatic bottom-discharge action does in cutting haulage and dumping costs . . . how this simple, fool-proof operation eliminates troublesome "gadgets" and high maintenance cost. Here's the trailer that never stops for discharging. Doors open automatically as the trailer reaches the discharge station . . . then close automatically by the simple forward movement of the trailer as it leaves the station. No manual labor whatsoever. Don't buy trailers without knowing everything about them. Investigate them all . . . investigate S-D Trailers now; compare them point for point for future profits.

6 to 50 Ton Capacities

S-D Trailers are built in sizes to suit your requirements exactly. The very low center of gravity permits fast, easy manipulation and affords relatively low over-all height for given capacities. The special, extra capacity features of the nationally known S-D Automatic mine car have been incorporated in the S-D Trailer to attain the maximum capacity for given over-all dimensions. Write now for completely Illustrated Bulletin No. 1255 for full details.

SANFORD-DAY

MINE CARS, ALL TYPES
TRAILERS · WHEELS · SHEAVES

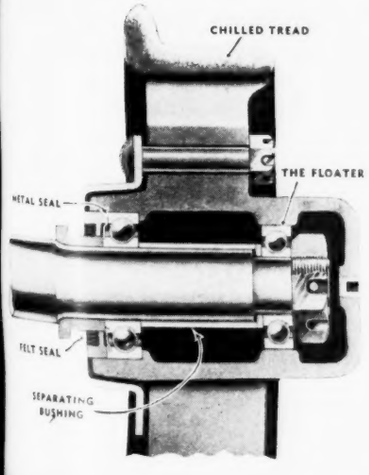
MINE OFFICIALS

If it's mine cars you need, investigate all types and makes thoroughly.

r thorough investigation of all types and makes mine cars is our greatest aid in selling you S-D tomatics". Even though we furnish positive dence that "Automatics" will pay big, extra divi-ds, and even though we submit outstanding ords of savings, no information is so quickly and roughly convincing as that obtained through r own investigations. One operator writes us: changing over to 'Automatics' has increased our tput 100 tons per day with less labor cost". An-er writes: "—our 'Automatics' have reflected a savings of 20 cents per ton on our haulage cost". Such proved cases of savings are the rule—not the exception. It will pay you to look into them now. Write us for a list of S-D "Automatic" users . . . find out for yourself what you can save with this remarkable car . . . learn why so many operators standardize on "Automatics", once they try them . . . see for yourself how breakage of coal is so greatly reduced . . . how the 1-2-3 action of the "Automatic" lays the coal down gently, through one door at a time. Check up on "Automatics" now.

e Perfect Combination

"Automatics," equipped with S-D "Floater" ball g wheels, assure every mine operator unbeatable nies. We do not believe there is another wheel on market that has ALL the advantages of the S-D ter." Thousands of them are in service daily, mak-almost unbelievable savings. Take "Lubrication Sav-" for example: If you grease S-D "Floaters" more nce in 5 years, we pay the extra greasing cost. up your present yearly greasing bills. "Power ": Independent engineering tests show power s with S-D "Floaters" of 14 to 33% over other ion bearing wheels. It will pay you to figure with "Floaters."



You can cash in on the savings of S-D "Automatics" with "Floater" wheels on a Rental Basis

If you prefer, we will RENT S-D "Automatics" to you on a most liberal plan. You pay nothing but rentals on tonnage hauled, but your savings will amount to more than your rentals. Get a copy of our rental contract . . . see for yourself what you're missing in profits without S-D "Automatics".

MAIL THIS MEMORANDUM NOW

SANFORD-DAY IRON WORKS, INC.
1120 Dale Ave., Knoxville, Tenn.

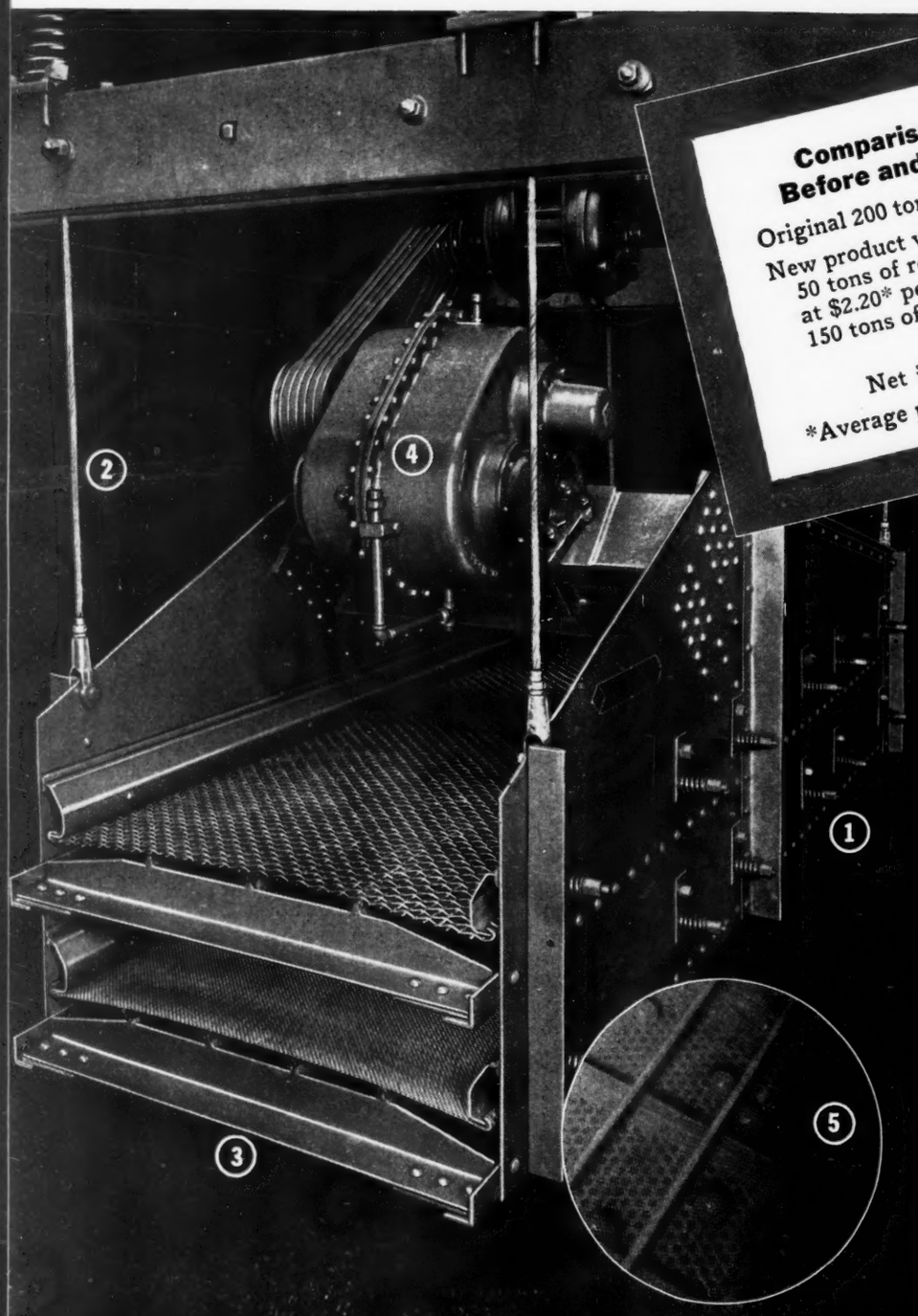
Send me complete information on— ☐ S-D Trailers ☐ S-D "Automatics" ☐ S-D "Floater" Wheels ☐ Mine Car Rental Plan.

NAME ..... TITLE .....

FIRM .....

ADDRESS .....

REVENUE INCREASED $50 TO $75



Comparison of Typical Daily Statement Before and After Use of Sta-Kleen Screen

Original 200 tons of slack at $0.75* per ton		$150.00
New product with Sta-Kleen Screen		
50 tons of reclaimed stoker coal at $2.20* per ton	$110.00	
150 tons of remaining slack at $0.75*	112.50	
		$222.50
Net increase using Sta-Kleen Screen		$ 72.50

*Average price.

FIVE EXTRA PERFORMANCE FEATURES OF THE NEW STA-KLEEN SCREEN THAT MEAN EXTRA SAVINGS FOR YOU!

1 *Installed horizontal...fits readily into limited space.*

2 *Suspended from cables and springs ...eliminates transmittal of vibrations to tipple structure.*

3 *Can be equipped with bottom plate to convey fines to discharge end . . . making unnecessary an extra bin under the screen.*

4 *Vibration mechanically produced . . . by simplified fully enclosed oil tight mechanism.*

5 *Secondary vibration imparted by special rubber balls MAKES CLOTH NON-BLINDING.*

"THE ONLY MACHINE THAT WILL satisfactorily screen fine, wet coal!" That's the way the Gatliff Coal Co. describes the new Allis-Chalmers Sta-Kleen Screen.

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

PER DAY AFTER INSTALLING STA-KLEEN SCREEN!

Gatliff Coal Company Recovers 50 Tons Per Day of Small Stoker Coal from Slack . . . Gets Extra $1.00 to $1.50 Per Ton. Here's an Example of How You Can Get in on the Big Profits of the Growing Stoker Market . . . by Installing an Allis-Chalmers Sta-Kleen Screen . . . the Screen that Beats Blinding!

As a progressive coal man, you're always on the alert for new markets . . . new sources of distribution for your products and by-products. And when one mine owner opens up a new market that nets him $50 to $75 a day on an investment of less than $2500, you'll want to find out all about it . . . learn how you can go after those extra profits!

The Gatliff Coal Co., Gatliff, Ky., had a tough problem. They had to screen and market their slack — 200 tons per day of 3/8" x 0 screenings on which they could realize only 50 cents to $1.00 per ton.

One screen failed on the job. With another double deck screen, they had to give up entirely on the 1/8" lower deck . . . and only by stationing a man at the screen to pound the cloth with a paddle could the 1/4" top deck be kept open.

Then — a year and a half ago — they installed an Allis-Chalmers Sta-Kleen Screen . . . the screen that uses the secondary vibration of special rubber balls to keep the openings free! They found that they could get even finer sizing than they needed.

Reclaims 50 Tons Per Day!

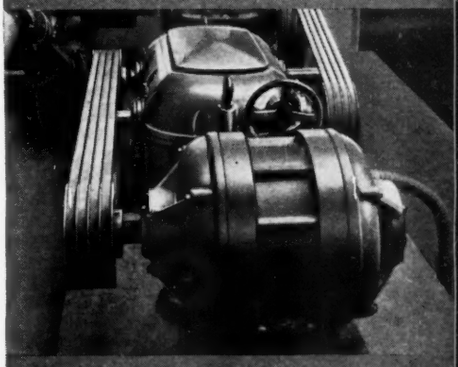
Out of their 200 tons per day of slack, Gatliff Coal Co. reclaimed 50 tons of this stoker product, selling from $2.00 per ton up. Figure out for yourself what this netted them! Then look at the accompanying daily statement . . . and figure out what an increase in revenue like that could mean to you!

Don't lose time! There's a trained engineer in the Allis-Chalmers district office near you ready to show you how you can fit a Sta-Kleen Screen into your plant. Bulletin 2361 gives you complete data on how the "screen that beats blinding" can mean extra revenue . . . increased profits for you. Write for your copy . . . today!

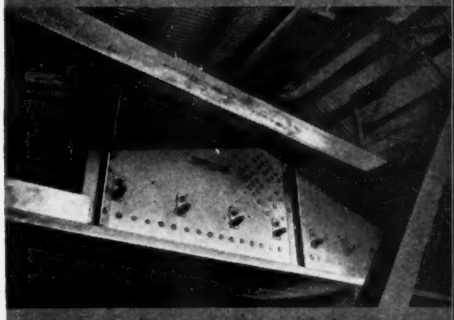
A 1207

NEWS OF OTHER ALLIS-CHALMERS PRODUCTS THAT CUT YOUR COSTS!

For more water at lower cost the coal industry chooses Allis-Chalmers centrifugal pumps. Here is a multi-stage SSUnit (close coupled pump and motor), rated 100 gpm at 285 ft head; for coal mine service, it is an all-bronze acid-resistant unit.



By coupling a standard squirrel cage motor to the new Vari-Pitch Speed Changer, you can get smooth, sensitive variable speed control. Here positive, slipless Texrope Drives link the Speed Changer to an Allis-Chalmers Lo-Maintainance Motor to regulate speed of a coal conveyor to coordinate with mine output.



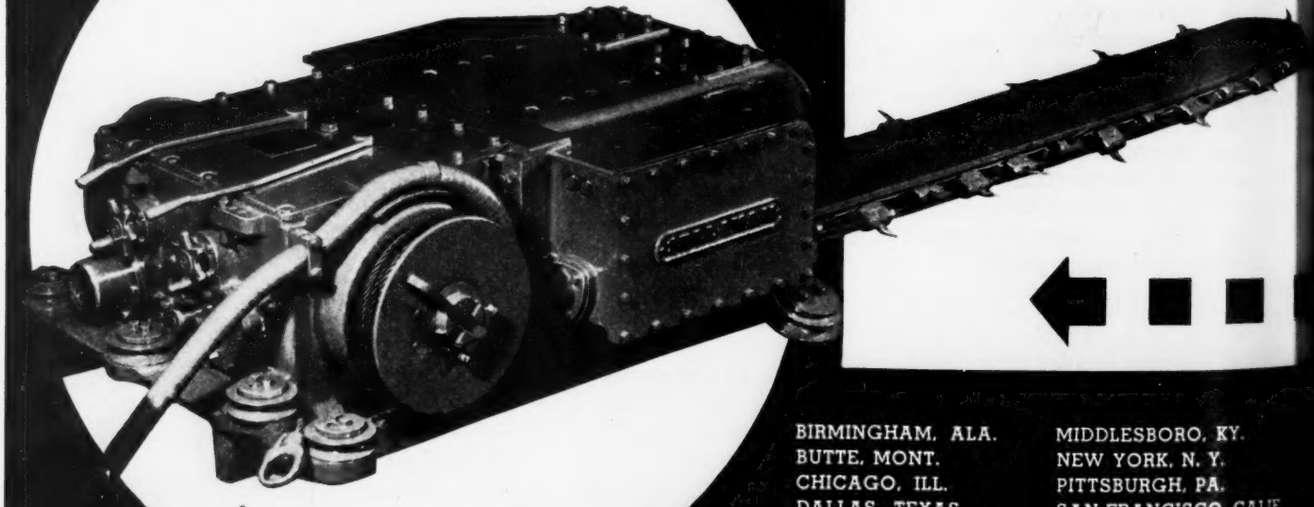
The space-saving adaptability of the famous Allis-Chalmers Horizontal Low-Head Vibrating Screen is brought out by this installation. Cable-suspension permits this 5'x14' double deck screen to be installed directly under the roof of the tipple of this Indiana mine, where it removes fines from crushed coal.

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

KEEPING AHEAD *with t*

THE 7-B "SUPER"
SHORTWALL



BIRMINGHAM, ALA.
BUTTE, MONT.
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DALLAS, TEXAS
DENVER, COLO.
EL PASO, TEXAS
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KNOXVILLE, TENN.
MIDDLESBORO, KY.
NEW YORK, N. Y.
PITTSBURGH, PA.
SAN FRANCISCO, CALIF.
SALT LAKE CITY, UTAH
SCRANTON, PA.
ST. LOUIS, MO.
JOHANNESBURG

the SULLIVAN 7-B "SUPER" SHORTWALL

EFFICIENT operating cycles in modern mechanized mines depend upon all machines being "matched" units. The cutting machine must have a capacity greater than that of the loader to insure against delays in production resulting from the loader catching up with the cutter. Speed, power, dependability and safety have been combined in the 7-B "Super" to provide a shortwall with cutting capacity that keeps pace with modern production methods.

These same features are reflected in increased profits and lower production costs wherever the 7-B "Super" is used: in thick or thin seams of coal, on conveyor mining systems or where the conventional room and pillar system of mining is employed.

Earn more profits by keeping ahead with THE SULLIVAN 7-B "SUPER" SHORTWALL

THESE SAFETY FEATURES ARE MONEY SAVERS

1. Government approved construction.
2. Simple, compact rear end control.
3. Lever controlled rope drums for instantaneous stopping:
4. Self-locking worm drive for drums.
5. Two-fold protection against oil entering motor.
6. Drop-out chain clutch.
7. Stop and start push buttons for rigid motor control.
8. Instantaneous and thermol overload protection.
9. Direct lead of feed rope—no swivel type sheaves.

A Machine for Every System of Mining

SULLIVAN MACHINERY COMPANY

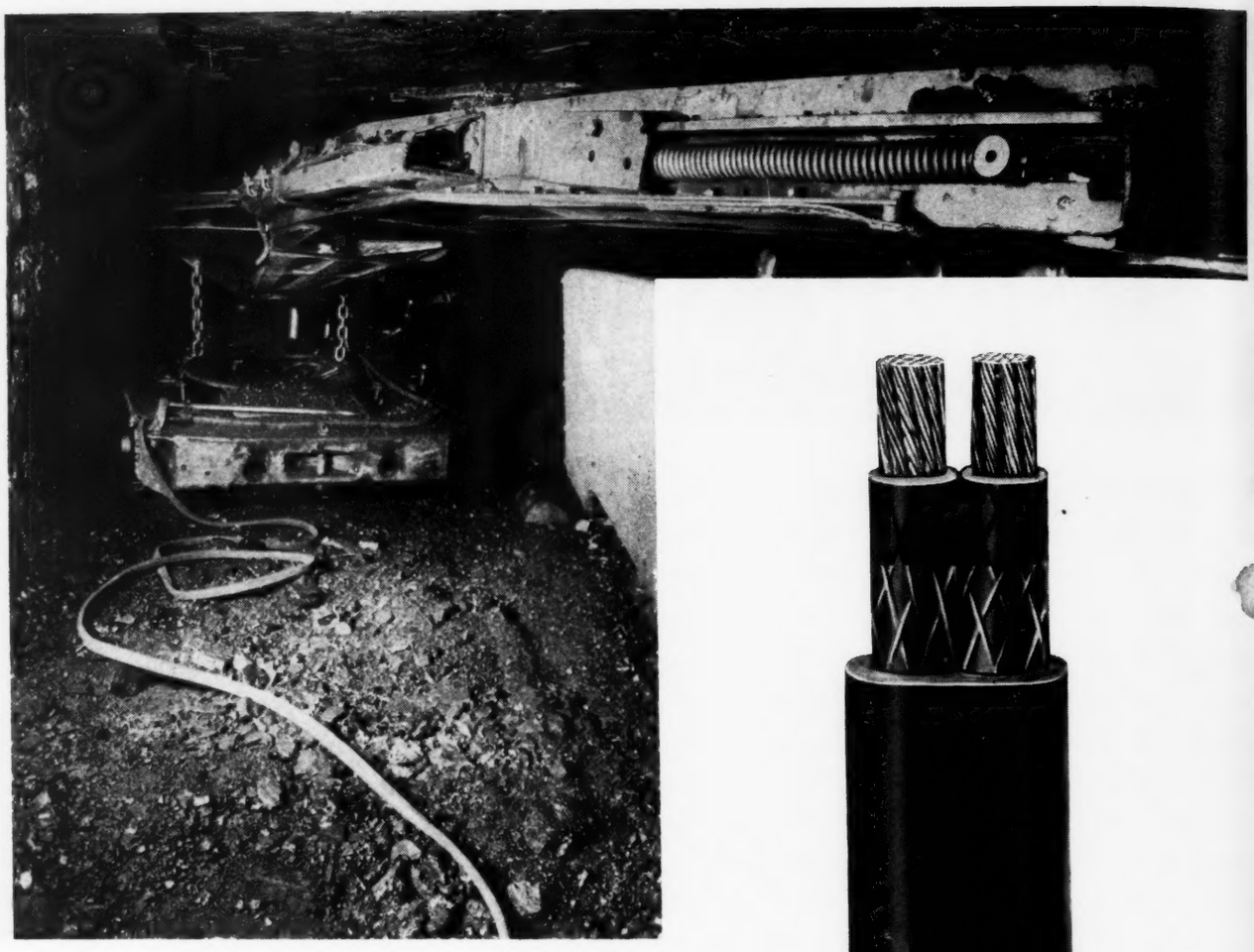
EXECUTIVE OFFICES — MICHIGAN CITY, INDIANA

FACTORIES: MICHIGAN CITY, INDIANA; CLAREMONT, NEW HAMPSHIRE; GRANTHAM, ENGLAND

Associated House: CANADIAN SULLIVAN MACHINERY COMPANY, Ltd., DUNDAS, ONTARIO

COAL MINING MACHINES • SCRAPER HAULERS • ROCK LOADERS • HOISTS • CAR PULLERS • AIR COMPRESSORS

ROCK DRILLS • CUTTER BIT SHARPENERS AND HEATERS
CORE DRILLS AND CORE DRILL CONTRACTING



Twin Parallel

HAZACORD CABLES
MOLD-CURED 60% TOUGH RUBBER JACKET

Single Conductor Reel Cable

Two Conductor Concentric Cable

Three Conductor for AC Machines or Low Tension Stripping Shovels

HAZACORD tough mold-cured 60% rubber jackets stand abuse that would quickly destroy a less well-made cable. They will take bruising blows, pulling around sharp rock or coal edges, over switch-latches or other obstructions, through mud and water, and other rough usages. Their toughness means very few repairs and therefore real economy. Because Hazard has been making cables for mining use for over 40 years, their experience is your guarantee of quality and long life. Hazard Insulated Wire Works, Division of the Okonite Co., Wilkes-Barre, Pennsylvania. Offices in principal cities.

HAZARD
ELECTRICAL CABLES

TODAY

INDUSTRY'S GREATEST RESPONSIBILITY

Production Speed-up!

PRODUCT THAT HAS HELPED OTHERS CAN HELP YOU

(See other side)

ON THESE MACHINE BEARINGS

. . . TYCOL GREEN CAST GREASE reduced applications by 33⅓% and the consumption by 66⅔% . . .

A well-known rubber mill encountered the usual trouble of hot bearings and excessive wear on a huge mixer. But that was only half the headache. The grease lost its body under heat, ran out of the bearings and damaged the product. » » » Grease in rubber spells loss . . . Changing to TYCOL GREEN CAST GREASE stopped this highly unsatisfactory condition immediately. Tycol Greases hold their body and prevent over-heating and wear on bearings. That's why fewer greasings and less grease are necessary. It's easy to see that switching to Tycol was highly profitable. » » » . . . This mill now knows . . . in dollars and cents . . . the full meaning of "less soap, more high quality cylinder oils" in TYCOL GREEN CAST GREASES. Let us prove it to you . . . show you the extra lubrication value in every pound of Tycol Grease. There is a Tycol Grease or Oil scientifically engineered to fit every industrial need. Write for all the facts.

TIDE WATER ASSOCIATED OIL COMPANY
EASTERN DIVISION
17 Battery Place • New York, N. Y.
Regional Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

INDUSTRIAL TYCOL OILS-GREASES

TIDE WATER GREEN CAST GREASES

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL US

It's always fair weather for WALTER 4-POINT POSITIVE DRIVE

UNLESS we miss our guess, coal strip-miners will have their hands full this winter keeping up with the normal demand for fuel, plus the requirements of our national defense program. Certainly this season—more than ever—you must avoid tie-ups anywhere along the line. No matter what kind of weather or road conditions you run up against, you must keep the coal moving from mine to tipple without a hitch—and at a profit. That kind of haulage calls for something better than ordinary rear-wheel or conventional four-wheel drive motor trucks.

Never mind what the specification sheets tell you, the rated horse power of a motor truck isn't what it's cracked up to be unless you have plenty of that other stuff called "traction". And to be sure of all the traction you need when you need it most, you have to have trucks with that combination of features that are found complete only in WALTER FOUR-POINT POSITIVE DRIVE TRACTOR TRUCKS. That means Automatic Lock Differentials, Suspended Double Reduction Drive, High Ground Clearance, Tractor Type Transmission, Superior Braking Capacity and other important points that make Walter Trucks always dependable for coal strip-mining.

Come snow or ice or rain or mud—it's always fair weather to WALTER FOUR-POINT POSITIVE DRIVE TRACTOR TRUCKS.

Send for literature

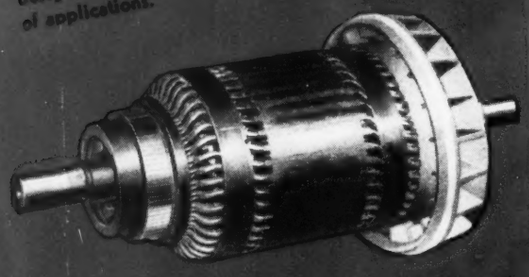
WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

There's DOUBLEP

in the NEW FEATURES o

G-E direct-current motor, Type B, typical of the smaller ratings. Additional protective features and the compact design make it readily adaptable to an increasing number of applications.

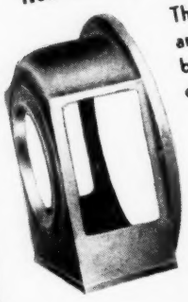
G-E direct-current motor, Type CD, typical of the larger ratings.



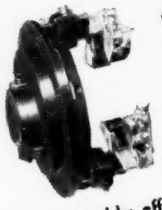
Armature is dynamically balanced. Welded end fingers hold laminations tight. Radial ducts in punchings, and openings in the 4-arm spider that hold them, provide positive ventilation.

The commutator is baked while under high pressure. Then the copper and mica segments are drawn together under high pressure while the commutator is still hot. Red Glyptal varnish applied to the end of this unit provides a smooth, arc-resistant surface.

An improved ventilating system, designed for reversible rotation, gives positive axial ventilation through the motor.

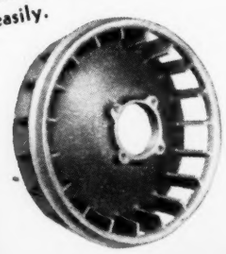


The same bearing bracket is used for ball and sleeve bearings, and the bearings can be removed without disturbing brush-rigging connections.



The larger motors have a new "V-type" brush holder designed for reversing service.

Split construction of the highly efficient fan scroll, which forms the drive-end bearing bracket, allows the scroll to be removed easily.



The radial-blade fan is cast-aluminum and specially designed for use in reversing service. The fan is rabbetted and bolted to the armature spider.

E PROTECTION

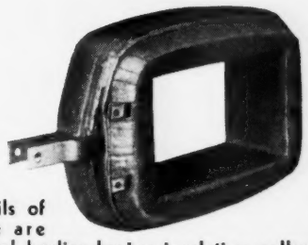
S of G-E Direct-current Motors

Exposed Parts Protected against External Damage

The over-all design of the open motor makes it readily adaptable for use even on jobs that have natural hazards to motor life. It not only safeguards the motor parts, but also increases safety for workmen.

Protected Internally against Electrical Failure

Electrical protection is gained through the use of Formex magnet wire in the armatures and field coils, and by a final treatment of a specially developed Glyptal base insulating varnish which gives additional value to the other fine insulating materials used.



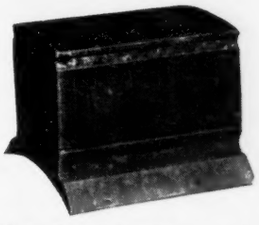
Main field coils of Formex wire are wound on spool bodies having insulating collars that insulate coil and pole from frame. Each coil is taped, dipped, and baked. A completed coil is shown above.

OTHER new features of G-E d-c motors include such improvements as cast-aluminum fans specially designed for reversing service; reversal without changing any part of the frame, fan, or brush rigging; compact assembly; more positive ventilation; lower WR^2; small diameter, which means low headroom needed; and interchangeability of ball- and sleeve-bearing brackets on the larger motors.

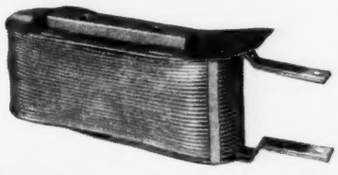
These and additional features which all sum up to increased all-round performance and protection are rolled-steel frames, V-type brush holders, cast-brass brush-holder boxes, accurately centered rabbet fit of precision machining, extra large conduit box, provision for lubricating and flushing of bearing while motor is running, punched commutator segments, Textolite wedges in armature slots for winding protection, and constant air gap.

All current-carrying parts and rotating parts, except shaft extensions, can be enclosed readily for protection of operators.

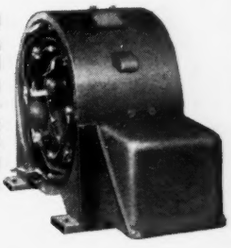
Surely you will want to learn more about motors with such outstanding improvements. These G-E direct-current motors are being applied in increasing numbers on jobs for which standard designs formerly were not recommended. They are fully fitted to fill the bill on your jobs. Call our local office. General Electric Company, Schenectady, N.Y.



Main field pole pieces are laminated silicon steel, welded together and securely bolted to rolled-steel frame.



Commutating coils are made of edgewise-wound copper strip with enamel turn insulation, and are insulated from the pole by a layer of laminated acetate paper.



Continuous rabbet fit of rolled-steel frame assures accurate concentricity and alignment of the bearing bracket. Additional insulation protects the basic dielectric strength of Formex wire, and red Glyptal varnish protects the coils.

GENERAL ELECTRIC

This is No. 6 in a series of informative articles for wire rope users prepared by the Macwhyte Wire Rope Company.

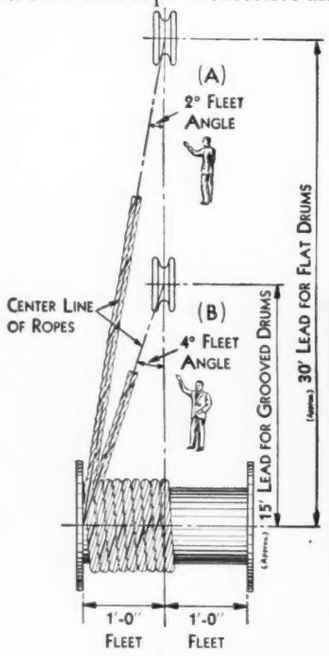
Correct rope reeving saves wire rope dollars . .

Avoid excessive fleet angles on your equipment

The fleet angle is that angle included between lines drawn from the center of the drum, and from the flange of the drum, to the lead (first) sheave. Both (a) and (b) below are illustrations of fleet angles.

Wire rope is often seriously damaged when this fleet angle is excessive. Side wear and severe scuffing result. Often individual wires become misplaced, bruised, crushed.

Grooved drums are damaged, too, by wide fleet angles. Ropes wear against the groove walls, grinding them down. Wear on the rope is excessive also.



WHAT TO DO

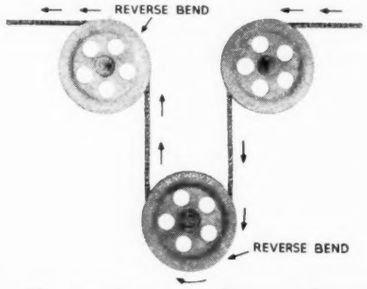
Check the fleet angles on your equipment. Keep the angle as small as possible. A fleet angle between 1° and 1½° is ideal. Fleet angles as low as ½° and up to 2° for flat faced drums and 4° for grooved drums are permissible for most hoisting equipment. If the fleet angle exceeds these values, then look out for excessive drum wear or poor spooling.

Guard against reverse bends

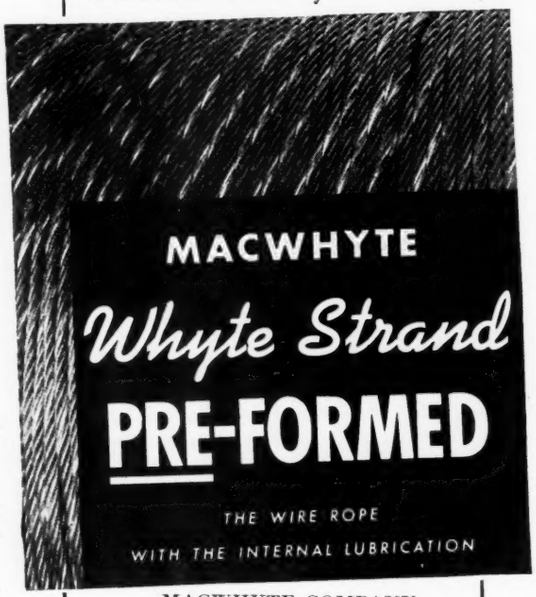
Years of experience and many tests have proved that reverse bending and excessive wire fatigue reduces rope life as much as 50%.

Where reverse bending cannot be eliminated, use the largest sheaves possible and place them as far apart as you can. By getting the MAXIMUM distance between reverse bends, you reduce fatigue—provide for longer service.

Keep sheaves aligned, too. Countless rope dollars have also been lost because sheaves are out of line.



You can detect misalignment by uneven groove wear. Keep sheaves in line. You'll save money.



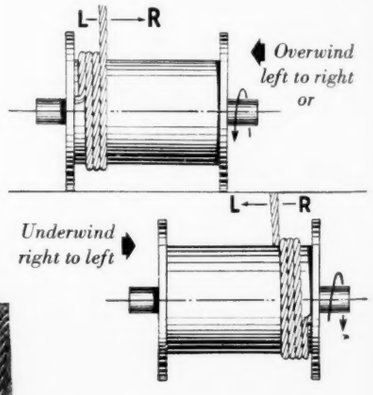
MACWHYTE COMPANY
2940 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of rope wire—braided wire rope slings—Monel Metal and Stainless Steel wire rope—aircraft cable, tie-rods, and 'Safe-Lock' terminals for aircraft—and wire ropes for all requirements.
New York . . . Pittsburgh . . . Chicago . . . Ft. Worth . . . Portland . . . Seattle . . . San Francisco
DISTRIBUTORS THROUGHOUT THE U. S. A.

Steer clear of slip-shod spooling

Make sure the rope is wound on your drum in the *correct direction.* Rope wraps will then be close to each other and in line. Rope wear will be reduced to a minimum.

If rope is started in the *wrong direction,* however, uneven winding will result. Ropes cross and crush each other, causing a "burning" and scuffing of wires.

The following drawings show correct spooling for right lay rope when observer stands behind drum looking toward the direction of rope travel:



SEVERAL LAYER WINDING

There is usually considerable wear and scuffing against drum flanges when ropes change from one layer to the next. You can offset this condition in two different ways:

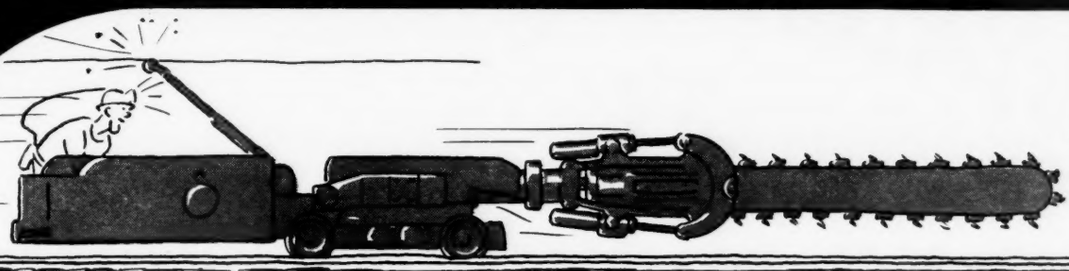
FIRST, and most effective, use rope of such length that there will be only one layer of winding; or when this is not possible . . .

SECOND, use a rope of MORE than sufficient length so that a short section can be cut from the drum end occasionally. This moves up the point of wear.

Previous articles in this series are available on request on your company letterhead, also G-13 general wire rope catalog containing much helpful information.

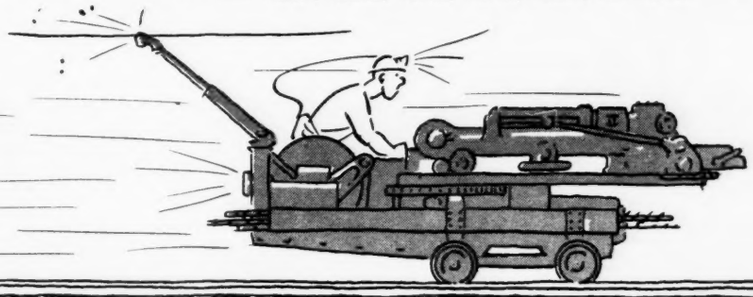
NO. 485

THE Big 3

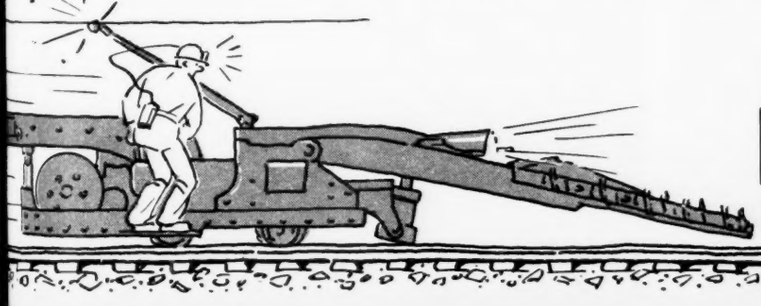


29 U
CUTTER

Patented and Patents Pending. Also licensed under the patents of E. C. Morgan. Patents Nos. 1706961, 1706962, 1707132, 1707133, 1953325, and 1953326.



56 A
DRILL



L 400
LOADER

BERT the BOSS :

Just give me equipment that runs on the track,
I'll show you a cost sheet that's balanced in black.
As speed is the byword for mines of today,
And safety the watchword for care on the way;
My track is well laid with the wide side kept clear,
We highball our tonnage with nothing to fear.
The men in my crew are the best of the breed,
Come on down and meet them, we'll show you some speed.

THE JEFFREY MANUFACTURING CO.
COLUMBUS, OHIO

Announcing NEW BIG THREE Series.

Bethlehem products

step-up mining efficiency

Longer life for chutes and shovels with Bethlehem Abrasive-Resisting Plate

Bethlehem Abrasive-Resisting Plate has a decided advantage over ordinary carbon steel in equipment subjected to the gouging, grinding action of coal, rock, slate, and gravel. In installations it has shown from 2 to 10 times the life of carbon steel and in many cases it has outlasted higher-priced alloy steels. Bethlehem Abrasive-Resisting Plate is available in two grades: No. 235 and No. 300, the numbers indicating the approximate Brinell hardness. No extra treatment is needed to bring out the abrasive-resisting properties of either grade.

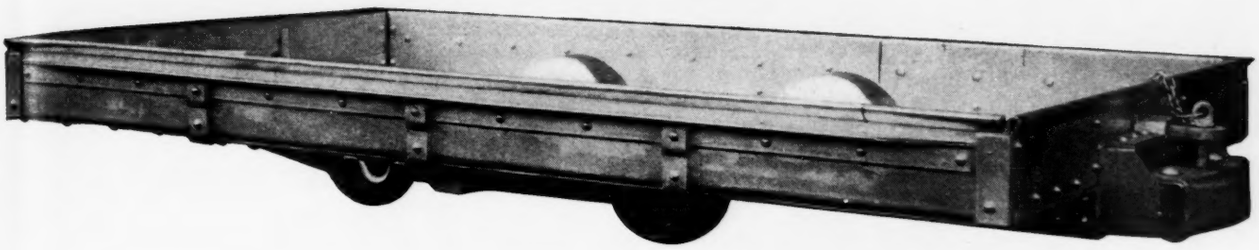
No bristling—no seizing on Bethlehem Formset Rope

If a wire should break in Formset Purple Strand Tugger Hoist Rope, it stays in place. It can't bristle out or fold across and cut the rope in passing over sheaves. Every strand in this rope is preformed to the exact shape it will take in the finished rope. As a result the rope is always relaxed and easy to handle. Furthermore, it can be cut or socketed without seizing.

Try Formset Purple Strand in your own mine. Made of Improved plow steel, it's lubricated from core to crown and is marked with Telfax tape for identification.

Bethlehem Products for the Mining Industry: Rails . . . Steel Ties . . . Frogs, Switches, Switch Stands, Turnouts and Special Trackwork . . . Track Bolts, Nuts, Spikes . . . Mine Cars . . . Wheels, Axles . . . Bars, Plates, Structural Shapes . . . Steel Construction . . . Steel Timbering . . . Pipe, Boiler Tubes . . . Galvanized Roofing, Siding . . . Wire, Nails, Fence . . . Wire Rope, Strand . . . Drill Steel . . . Forgings . . . Castings . . . Pig Iron.

BETHLEHEM STEEL



Two extra tons of coal in Bethlehem all-steel cars

In thin-seam mines Bethlehem all-steel stub-axle cars haul more coal per load than composite cars of the same size.

The thickness of the steel in one of these all-steel cars is but a fraction of the thickness of the wood bottom in a composite car—this means added coal carrying capacity.

By stub-axle construction the bottom of the car can be lowered to the point of minimum clearance—in this way every possible cubic inch of capacity can be used to advantage.

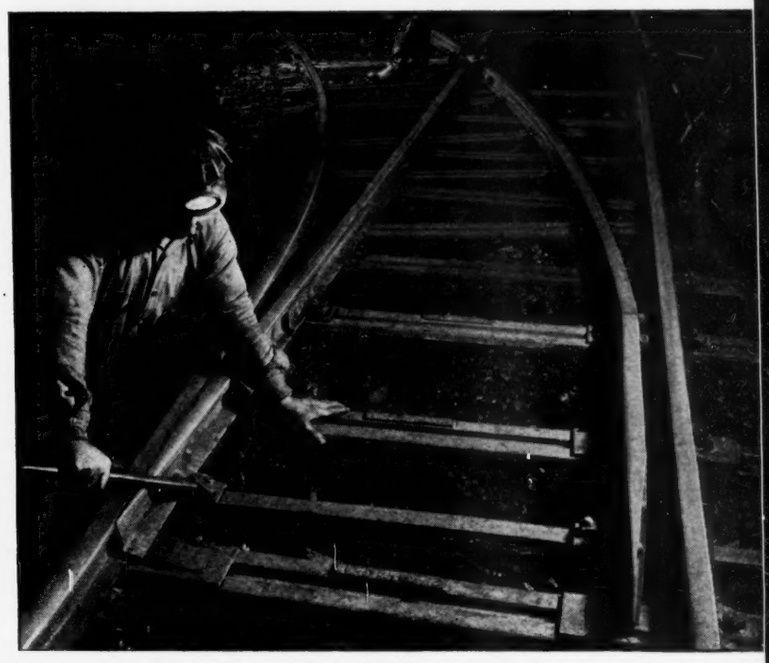
For the same overall dimensions Bethlehem's all-steel, stub-axle construction increases the capacity about 15 per cent over wood or composite type cars. And in extremely low cars the percentage of increase is even greater. Tapered roller bearings effectively reduce friction and make these cars easier to handle in spite of much greater loads.

Superior Hollow Drill Steel meets all coal mining requirements

Bethlehem Superior Hollow Drill Steel in hexagonal, round and quarter-octagonal sections is giving bang-up service for many of the country's major coal operators.

The clean, tough steel used in Bethlehem Superior is bloomed under accurate temperature control—representative billets undergo hot-acid etch inspection to insure soundness—further tests insure uniform response to any hardening treatments.

It has a smooth, well-centered hole free from pits or defects which might give fatigue stresses a foothold.



Two and one-half man-hours lay this Bethlehem turnout

Only two and one-half man-hours are required to lay this complete Bethlehem room-entry turnout. This is about one-fifth the time required for older types.

The complete turnout is made up of Bethlehem regular steel ties along with two special switch ties; closure rails cut to length and accurately bent; switch plates; heavy-duty rail braces; switchstand; switch-points and frog.

These simple and efficient turnouts automatically gage the rails, points, and frogs and permanently hold them in line.

BETHLEHEM STEEL COMPANY

A "Rubber Railroad"

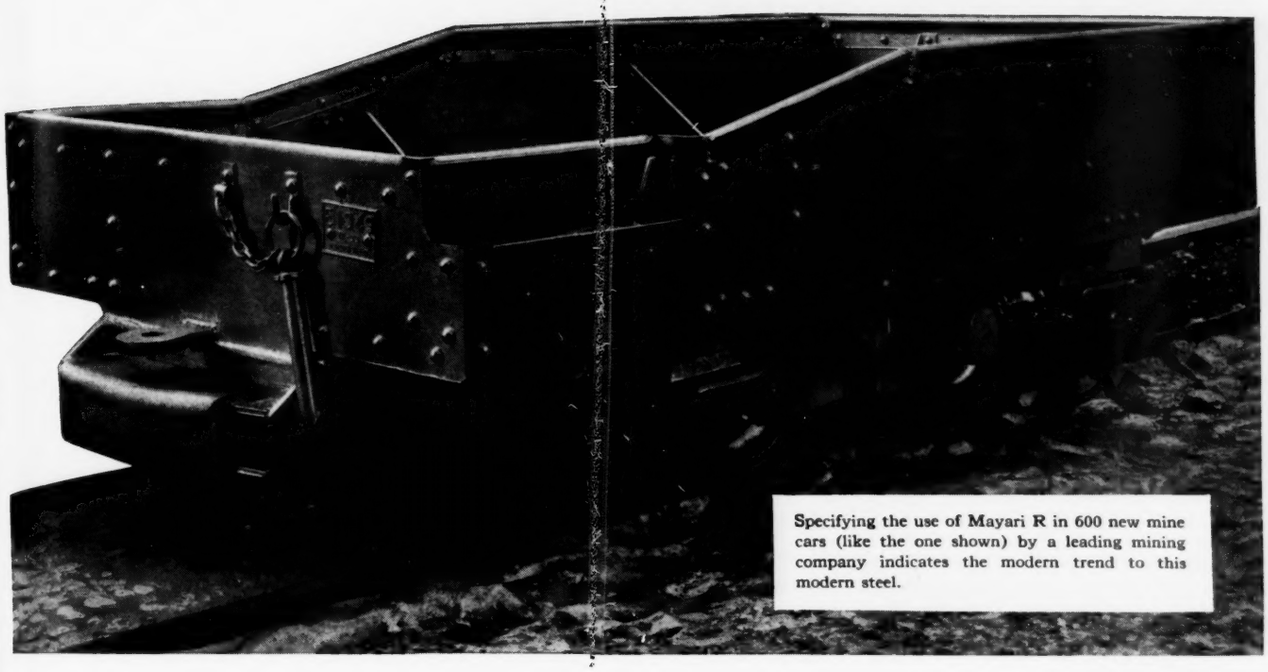
10 MILES LONG!

—world's lowest-cost transportation system

THE great installation you see here is one of the world's most spectacular engineering feats — the longest conveyor belt transportation system ever built! Ten miles long in all, this giant "rubber railroad" is the main line for transporting construction supplies to the great Shasta Flood Control Dam. Designed by the G.T.M. —Goodyear Technical Man— it beelines across wastelands, bridges rivers, climbs over a range of hills 1,350 feet high, carrying a peak capacity load of 22,000 tons per day. In four years it will deliver 10,000,000 tons of sand, gravel and crushed stone—*at far lower cost per ton than any other haulage method!* This mammoth conveyor is the outgrowth of other historic installations ranging from one to five miles in length that have proved the unrivaled economy of belt transit in handling huge tonnages over terrain where other transportation does not exist or costs prohibitively. If you have such a problem, consult the G.T.M. Write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER
GOODYEAR

Build Today for Tomorrow



Specifying the use of Mayari R in 600 new mine cars (like the one shown) by a leading mining company indicates the modern trend to this modern steel.

with MAYARI R

Mayari R makes it practical to build for tomorrow's needs today. With this high-tensile, low-alloy steel you can build lighter and stronger; build for increased endurance under severe corrosion; build to carry greater loads with lower maintenance; build to withstand both impact and abrasion.

The use of Mayari R requires no changes in existing shop practice and only a slight allowance for its greater strength. It is a steel with uniform grain and properties consistent throughout the section. It is used without heat treatment and can be used to advantage in all the usual gas and electric welding methods. Mayari R welds without air-hardening effects; its weldability is superior to other steels of its class.

Mayari R can be used in all the usual applications of mild carbon steel. It is available as sheets, strip, structural shapes, plates, bars, rivets, and cold-formed sections. Common practice is to use lighter weight members of equivalent strength to that of mild carbon steel, thus effecting weight savings up to 50 per cent depending on design and application.

Catalog on Request—A catalog describing Mayari R will be sent on request.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

1
2
3

Where there's Coal there's JOY LOADERS

JOY LOADERS assure you of lower operating costs with all three systems of secondary haulage

1. **MINE CARS**
2. **CONVEYORS**
3. **SHUTTLE CARS**

Consult a JOY Engineer on the Loader best suited to your conditions for low cost operation

JOY MANUFACTURING CO.
FRANKLIN ··· PENNSYLVANIA

In Blasting *Safety lies in* SKILL

Use the brand of Ensign-Bickford Safety Fuse best suited to the conditions in your mine.

Give yourself TIME, for a little more fuse is a lot more safety. Cut the fuse off CLEAN; seat it SNUGLY in the cap; secure cap and fuse with a CRIMPER. See that the hole is in the CENTER of the primer cartridge so that the cap will be INSIDE—well protected. Tie fuse and cartridge together TIGHTLY. Load and tamp carefully; and be sure that the fuse extends well out of the mouth of the bore hole when the primer cartridge is in place.

Remember, in blasting operations safety lies in skillful handling of each operation!

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONNECTICUT

Ensign-Bickford SAFETY FUSE

MANUFACTURERS OF SAFETY FUSE SINCE 1836 • ALSO PRIMACORD-BICKFORD DETONATING FUSE

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • DECEMBER, 1940

Pertinent and Impertinent

• PRODUCERS enjoying increased realizations under minimum-price control should not be chided if the Christmas spirit makes them see the Guffey act in the guise of a red-garbed, rosy-cheeked, white-whiskered gentleman with bubbling abdomen. Alas! for the disillusioned who no longer believe in Santa Claus.

• JUDGING from reactions of those who heard him for the first time, the pre-election appeal of John L. Lewis won him many new admirers. But not—if the voting returns are any criterion—in the right places.

• OUTPUT of residential stokers last year, according to Bureau of the Census figures, showed an increase of 11.3 per cent over 1937. The average value per unit at the point of manufacture declined approximately 20 per cent. Both trends are healthy and one helps explain the other.

• HEAVY RAINS this past summer doubtless will change to heavy snows this winter, for this is a period of heavy precipitation. Now is the time to try out the possibilities of keeping sidewalks and streets free of snow by steam piping. Once made, a few samples in the larger cities would start that practice on its way.

• CONTINUING FRIENDSHIP with other nations, particularly the Dominion on the north and the republics south, is a policy all Americans will applaud. Jeopardizing the livelihood of thousands of workers in the United States, however, seems to be carrying neighborliness just a little too far. Yet that is what the St. Lawrence hydro-electric project threatens. Beggaring ourselves hardly puts us in a position to effectively help our neighbors.

• SELECTING AND TRAINING new employees are the first steps in a definite company investment in these workers. Each year that investment grows bigger. So, too, do the company's obligations to the man. His safety, therefore, means something altogether apart from compensation. Good men are too valuable a company asset to be frittered away —even in part—by an unhealthy accident rate.

• NEGOTIATIONS on a new Appalachian wage contract last year dragged out six weeks beyond the expiration of the old agreement. As a result, both management and labor ended up in the public dog house. With the national-defense program in full swing and coal so vital to that program, it would be doubly dangerous to the prestige and the future of the bituminous industry to repeat that performance in 1941.

• AVERAGE hourly earnings for bituminous workers continue high in the upper brackets of industrial wages. For August, the figure was 88c., topping metal mining by 15c. and nosing out public utilities by 1c. The average for manufacturing enterprises was 67½c., with hourly earnings 95½c. in automobile manufacturing, 96c. in tires and inner tubes, and 97½c. in petroleum refining. Not so bad for an industry over which the sob sisters shed so many briny tears.

• FACTORY CHIMNEYS belching heavy smoke have long been a popular symbol for industrial activity and prosperity. So it is not surprising, perhaps, to find a recent issue of *Time* painting an enthusiastic word canvas of industrial recovery with stacks pouring forth "columns of black, profitable smoke." To combustion experts, of course, black smoke means needless waste—not profit. Picturesque untruths—alas!—die hard.

Tires From Coal

BUTADIENE is the source of some of the synthetic rubbers from which tires and other rubber products already are being made and soon will be under manufacture on a commercial basis. Apparently, the usual source of butadiene is oil, but it can be made almost equally well from coal. Here is a possible outlet of no mean proportions for coal if the experimental work were done.

Drugs, dyes, fertilizers, explosives, illuminants and exterminators are not the only chemical derivatives of coal. Too many mining men, however, seem convinced that

these relatively unimportant tonnage uses are the only possible outlets for coal as a raw material. Yet coal might be chemically the veritable underpinning of civilization to be used for furniture, house trim, clothing, kitchen utensils, drinking vessels, paper, wrappings, automobile bodies, glass and a host of other purposes.

Borderline Cleaning

IF PREPARATION is to retain all desirable material and exclude all undesirable, the borderline portion of the feed needs a more accurate system of cleaning than can be performed by units intended to handle the bulk of that feed. Special units are sometimes employed for this purpose, or the middlings are added to the feed so as to give them "a further run for the money." Before recleaning, however, it may be advantageous to size more closely the products obtained in the preliminary washing or to use units having a finer discrimination for such borderline work. Exactitude is necessary not only to save coal and to approach correct average analyses but also because undesirable material inevitably segregates in transportation and handling and thus causes trouble in the sales end.

Clarifying Debate

WHEN "trackless mining" made its initial bow four years ago in southern Illinois, its advent was greeted with spirited debate. Much of the discussion, however, was more emotional than analytical. Proponents of the new method possibly claimed too much; opponents conceded too little. Today, with the system widely accepted, both schools are making a determined effort to buttress their positions with factual data.

Such an approach should be measurably facilitated by the new program of the committee on haulage roads of the American Mining Congress Coal Division. The committee's latest objective is a detailed field study of service-haulage track installations, equipment and costs. That study should both supplement and complement the scattered investigations of other recent toilers in this vineyard. It should give the groundwork for a worth-while isolation of secondary haulage costs and their relation to total mining costs.

This relationship and the relationship of the direct costs to the character of the installation, equipment and operating procedure may easily prove to be the nub of the whole question. Obviously, a comparison which does not embrace all the factors is of doubtful value. The more data which can be developed the better able the individual operator will be to determine true costs. And these costs alone can answer the question: Which system shall the individual operator adopt for his particular conditions?

Time for Resurvey

EVERYWHERE estimates of available coal resources are being recast. Many countries and small subdivisions now recognize that their original and present coal reserves have been greatly overestimated. Others, including Great Britain, Ireland and Russia, are revising their figures upward. Changes also are being made in estimates for the United States. A recent West Virginia report, for example, reduces the estimate of original resources published in 1913 in *Coal Resources of the World* 23.6 per cent.

Without information as to what is considered "minable," the true significance of such changes is difficult to appraise. The West Virginia Geological Survey declares that "minable" coals are not necessarily coals that could be recovered today at a profit but include many that must be left until better coals have been exhausted. A resurvey of coal fields the world over is needed.

Occupational Deferment

WITH the first draftees moving into training camps, occupational deferment for key workers in industry becomes a live issue. Today, it is true, there is a surplus of miners, but a real shortage of men qualified for supervisory positions. These men are essential to production. As the defense program goes into high gear, more and more coal will be required for armament manufacture. And, presumably, more and more men will be taken from industrial pursuits for military training.

No provision for deferment by occupational groups is embodied in the Selective Service Act. Fortunately, officials charged with administering that statute are not blind to the realities of the situation. "It is a basic principle of selective service at this stage of the national-defense preparation," states C. A. Dykstra, director of the service, "that material procurement is paramount. Therefore, where two requirements — military man-power vs. production — conflict, production should have priority."

Since no blanket exemptions are contemplated in the law, each application for deferment on occupational grounds must be considered individually. Determination of whether such application should be granted rests first with the local draft boards. Their decision is subject to appeal. The employer, however, must take the initiative if occupational deferment for any of his key men is desired.

And Coal Is Black

BLACKENING the soil increases warmth. In cold regions, it will speed growth by increasing the temperature of the soil and thus accelerating vital processes. In warm climates, where there is no lack of heat, it may be used to cool that part of the vegetation above the coal surface, for, if the heat is absorbed by the soil, it will not be reflected to the leaves and their tips will not be burned on the underside. This appears important in the life of tomatoes, celery and gladiolus.

Studies, still in their infancy, being made at the Southern Experiment Station of the U. S. Bureau of Mines and recorded in R. I. 3516, are planned to indicate the value of coal for the speeding of growth and for the protection it will give later to the growing plant. Coal is being sold for soil betterment in many countries and in sections of this country. It should furnish a market for much otherwise unmarketable material.

VIRGINIA CONVEYOR MINE

Has Rock-Tunnel Haulageway, Natural Drainage and Cable-Carried Power

By J. B. TAGGART
Whitney & Kemmerer, Inc.
and J. H. EDWARDS
Associate Editor, Coal Age

SIX workable seams—Kelly, Imboden, Clintwood, Blair, Dorchester and Norton—are found in the hills of Dorchester, Wise County, Virginia. Most of the tonnage of the Wise Coal & Coke Co. in recent years has come from the Blair and Dorchester beds. Approaching exhaustion of its acreage in the Blair seam led to the decision to open a new conveyor mine in the Norton bed. Management believed this would not only yield better coal and coke than obtainable by blending the Blair and Dorchester beds but that shorter hauls and the adaptability to conveyor mining promised lower production costs.

Preparatory to opening the new mine, the company drove a quarter-mile rock tunnel. This work was started in January, 1939, and was completed in June of the same year. First development of headings and airways followed immediately and by February, 1940, the operation was ready to produce its anticipated tonnage. The mine, now delivering approximately 10 tons per man-shift to the tipple, is laid out to take advantage of natural drainage for all rooms, butts and mains. Steel culvert-type overcasts which can be recovered and reinstalled are used in all but butt headings.

Special study of the power-distribution problem resulted in a decision to continue with existing 550-volt direct current for main-line motor haulage and to use 440-volt alternating current for all conveyors, mining machines, drills, blowers, etc. Four-conductor rubber cables with Miller fittings and gangs are installed throughout the mine to insure maximum safety for all employees and proper phasing at all times.

Lowest of the six beds in elevation, the Norton seam will average about 36 in. in thickness. It is approximately 100 ft. below the old No. 3 mine in the Dorchester bed, but a strata rise of 8 to 10 per cent toward an anticline in the west made it possible to reach the lower (Norton) seam with a tunnel from the upper mine while maintaining a slight grade in favor of the loads. This also permitted self-drainage. The existing drift mouth, outside tracks and tipple were utilized without change. The rock tunnel, rising at a grade of 0.6 per cent, is met by the Norton seam, rising at a grade of 8 to 10 per cent, 1,348 ft. from the tunnel mouth (see Fig. 1).

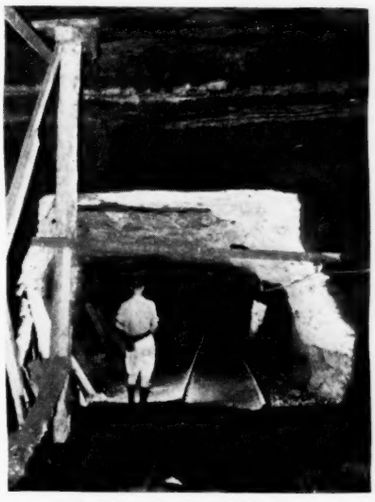


Fig. 1—C. L. Stallard, of the engineering department, holds a light flooding the start of the rock tunnel under the Dorchester seam, which can be seen next to the high roof

Tunnel driving was done with a Goodman shaker conveyor and duckbill. This particular equipment was chosen in part because its adaptability to the future mining plans was greater than that of other rock-loading machines. Since completion of the tunnel and the grading of a 1,200-ft. main airway to the outcrop and fan location (see Figs. 5 and 7) this equipment has been used in driving No. 1 main heading and aircourse. During the tunnel work it loaded and conveyed over 4,000 cu.yd. of rock to mine cars; since then it has handled 6,500 cu.yd. of rock and several thousand tons of coal.

The tunnel maintains a minimum section of 6x12 ft. It was completed in 5½ months and passes completely through the well-known Gladeville sandstone and the other rock formations directly above and below it. Begun on a two-shift basis, progress from Jan. 9 to Jan. 31 was 175 ft.; for February it was 153 ft. In March, a three-shift basis was inaugurated and 286 ft. driven. The nationwide suspension in April caused the loss of one-half month's work and cut the advance for that month to 175 ft. In May, 287 ft. was driven, and in June, 272 ft.

At first progress was slowed somewhat because the hard shooting scattered the rock far down the tunnel from the face. This necessitated that much of it be loaded into the shaker by hand. Furthermore, equipment left within 100 ft. of the face was likely to be seriously damaged. This difficulty was solved by loading only the two rib thirds of a lift before drilling and shooting the next lift. The pile of loose material left in the center effectively blocked the shots so that very little rock was thrown behind the loading range of the duckbill.

The 22 holes of a lift were fired with one stroke of the battery, but four sets

of delays were used. In Fig. 3, holes fired by instantaneous detonators are designated *I* and the delays by 1, 2, 3 and 4—the order in which fired. Holes other than the six "cut" holes in the lower center were drilled 6 ft. deep. Cut holes were drilled 8 ft. deep and angled in to meet at the back of the cut to give them greater pulling power. Other equipment purchased for the tunnel job and now utilized in the mine includes a low-vein Ingersoll-Rand 120 air-cooled compressor and two I-R JA 55 jackhamers.

Air for the mine is circulated by a Jeffrey 6-ft. Aerovane fan driven by a 10-hp. 440-volt Westinghouse motor installed at the outcrop end of a 1,200-ft. fanway driven through the coal. About 25,000 ft. of air per minute is drawn through the tunnel and along No. 1 main, where it is split at the mouths of the butt entries. Approximately 50 per cent of the air is taken to the main producing butts, 25 per cent to the advancing butts and 25 per cent on up No. 1 main.

The steel and concrete shown in Fig. 5 were deemed necessary for permanent protection of the tender roof near the outcrop. Lagging is 45-lb. steel rail resting on 5x12-in. I-beams. For the first 65 ft., the I-beams are on 24-ft. centers and are supported by concrete walls. For the next 60 ft. they are on 10-ft. centers and are supported by steel legs with concrete bases. Inby of that the top is sound and no supports are needed.

The mine is projected to recover around 70 per cent of the available coal. The main aircourse is 30 ft. wide and the main heading is 18 ft. Butt entries are 21 ft. wide and all rooms are 75 ft. All pillars are being abandoned for the time being, but later partial extraction of the barrier pillars along No. 1 main will be made. This main is driven on a rise of 0.75 per cent; the butt entries, which are turned off at 90 deg., are only a few degrees off the raise (see Fig. 2). Rooms are turned 75 deg. and 30 min. off the butts. Rooms on the right have a 3.0 per cent grade and those on the left a 1.0 per cent grade; thus, natural drainage is provided from all faces (see Fig. 4).

Because the seams pitch 8 to 10 per cent, entrance to the new Wise conveyor mine at Dorchester, Va., was made by driving a rock tunnel upgrade from the haulway of a higher seam. A self-loading conveyor used for this tunnel work now advances the main heading through 36-in. coal and takes top or bottom to provide 6 ft. for car haulage from butt-heading belts. Rock labor included, coal delivery to the tipple is 10 tons per man-shift. Existing 550-volt direct current was used for main-line haulage, but 440-volt a. c. power, handled through cables with connections made at specially built "gangs," was installed for other equipment.

Roof—a hard, tough and dependable slate overlain by sandstone—is excellent; bottom, too, is very hard. This combination provides an ideal condition for wide-room conveyor work. The seam contains a 2-in. slate band which generally appears about 20 in. from the bottom. This middleman is readily discernible and is easily separated from the coal at the face. Because of its presence, however, all coal must be carefully hand-loaded.

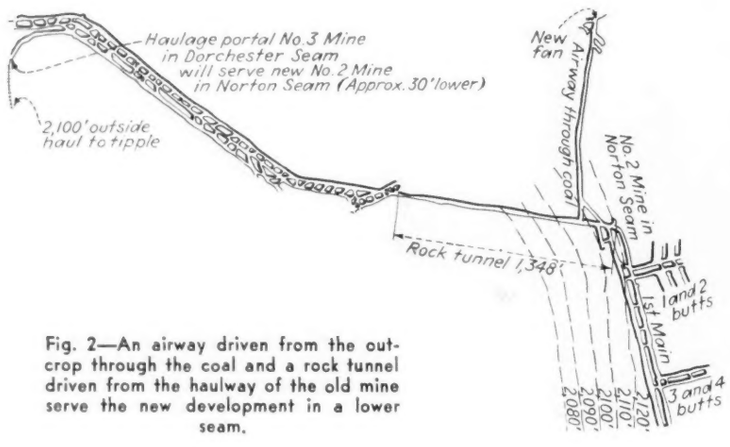


Fig. 2—An airway driven from the outcrop through the coal and a rock tunnel driven from the haulway of the old mine serve the new development in a lower seam.

All coal in the butt entries and rooms is loaded upon Jeffrey chain conveyors. In the rooms, Jeffrey 61-HG face conveyors discharge upon 61-AM room conveyors which, in turn, discharge upon a 26-in. 52-B Jeffrey belt. In driving entries, a room conveyor is carried directly up the center and no face conveyor is used. The speed of the 26-in. belt can be varied; at its present rate of 167 ft. per minute it will carry up to 300 tons per shift very comfortably.

Shakers Load Rock or Coal

For the most part, the Goodman shaker is confined to work where rock must be handled. It does all the haulage-heading driving, generally taking 300 ft. of coal and then dropping back to be advanced again over that same distance, taking such top or bottom rock as is necessary to give the required 6 ft. height and the best track grade. A double track is maintained in the haulage entry so that loading can continue at all points without interruptions by car changes and other haulage activities. Loading track is laid with 30-lb. rail, with 60-lb. on the main haulage track. Brown-Fayr hoists at the loading points handle car trips.

Mine doors have been eliminated by the use of overcasts. A permanent overcast at the end of the rock tunnel is the conventional type, but those at the mouths of butt headings consist of two 36-in. corrugated galvanized culverts. The wall shown in Fig. 6 (a picture at 6 Butt, where the heading is slightly overwidth) has wings to accommodate the pipe. The wall at the other end of the pipes is built straight across between rib centers. When 3 and 4 Butts are abandoned, the pipes from their overcast will be removed and built into the overcast for 7 and 8 Butts. The concrete blocks shown in the illustration also are used in constructing entry seals and main-line brattices. Experience has demonstrated that decided economies in time and money can be effected through their use.

Seals were built at 1 and 2 Butts immediately after the panel was finished on May 31, 1940, thereby eliminating future ventilation cost for that area and effectively blocking anyone from entering. Each seal consists of a row of concrete blocks plastered to limit leakage. Although gas in detectable quantities is not expected and has not been found in the present area, pipes for testing were built into

the seals. Miners are equipped with Edison Type K closed lights.

Conveyors on hand and in use at the time this article was written were: one Goodman G-15 shaker conveyor and duckbill, seven Jeffrey 61-HG face conveyors, six Jeffrey 61-AM room conveyors, one Jeffrey elevating conveyor, two Jeffrey 52-B 26-in. belt conveyors. All conveyors, blowers and hoists are equipped with Allis-Chalmers motors. Seven Jeffrey 35-20 short-wall machines are in use. One—on hand when the mine was opened—has a 6-ft. cutter bar and Star bits; the other six machines have 7½-ft. bars and Bowdil throwaway bits. Other inside equipment includes seven Jeffrey blowers and seven No. 571 Chicago Pneumatic drills with conveyor-type augers and McLaughlin heads.

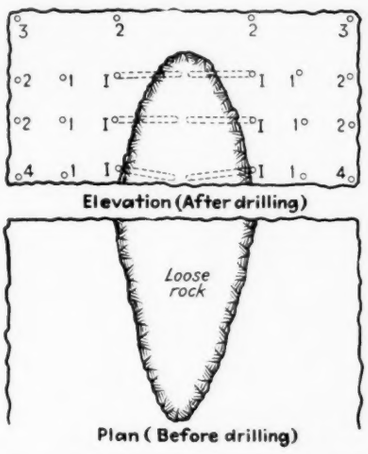


Fig. 3—Shooting before the loose rock in the center had been loaded out solved the tunneling difficulties.

Permissible explosives are used for shooting, which is done on shift. Thirteen holes are drilled on a 75-ft. face and all the shots are fired simultaneously by a series connection. A print of the shooting diagram (Fig. 15) is posted at the lamphouse and additional prints are given to the men intrusted with the shooting. Thirteen sticks—one per hole—are allowed per room cut.

The mine was planned to produce approximately 1,000 tons per day. At present, working two shifts, it averages about 675 tons. With five-men room crews and three-men crews in the headings, the miners produce from 12 to 13 tons per man-shift. Shift output, with six chain and one shaker conveyor in operation, ranges from 330 to 350 tons and is delivered to the tipple by 34 or 35 men.

Since 550-volt direct current had been used for all haulage and face activities at the older mines of the company, it was decided to maintain that voltage for haulage in the new operation. To insure maximum efficiency and eliminate, as far as possible, motor troubles and breakdowns, 440-volt alternating current was selected for all other equipment. With the cooperation of T. J. Jackson, West Virginia Engineering Corporation; Jeffrey Manufacturing Co. and the Mines Equipment Co., a system of power distribution and cable connections was designed. This includes a control system which coordinates the operation of the room and belt conveyors, thus eliminating the necessity of a man for stopping and starting the room conveyors.

Power is taken into the mine at 2,300 volts through an Anaconda Duraseal DD rubber-and-braid cable insulated for 5,000 volts and containing three No. 2/0 19-wire shielded conductors and three ground wires. The cable enters via the fanway where it lies on the bottom, but, after reaching the main entry, it is trenched into the coal rib (Fig. 12). At abandoned transformer stations where the cable must be joined, splices are protected in Anaconda iron boxes with voids poured full of compound.

Underground transformer substations—two in number and reducing to 440 volts—each consist of banks of three 37½-kva. Allis-Chalmers oil-filled transformers mounted on mine trucks. These trucks are parked opposite the two active pairs of butts; as one pair of butts is exhausted, its transformer station is moved ahead to serve at a new location. Each bank of transformers is protected by an oil circuit-breaker with overload trip in the 2,300-volt primary feed. Entry cables carrying 440 volts to "gangs" (junction boxes) are tied directly to transformer secondaries without fuse or breaker; thus the 2,300-volt breakers serve as protection for both secondary circuits and transformer windings. Early next year, primary voltage will be stepped up from 2,300 to 4,000. This change will involve little expense to the mining company and will reduce voltage and power loss.

The 440-volt distribution is by four-conductor rubber-covered cable.

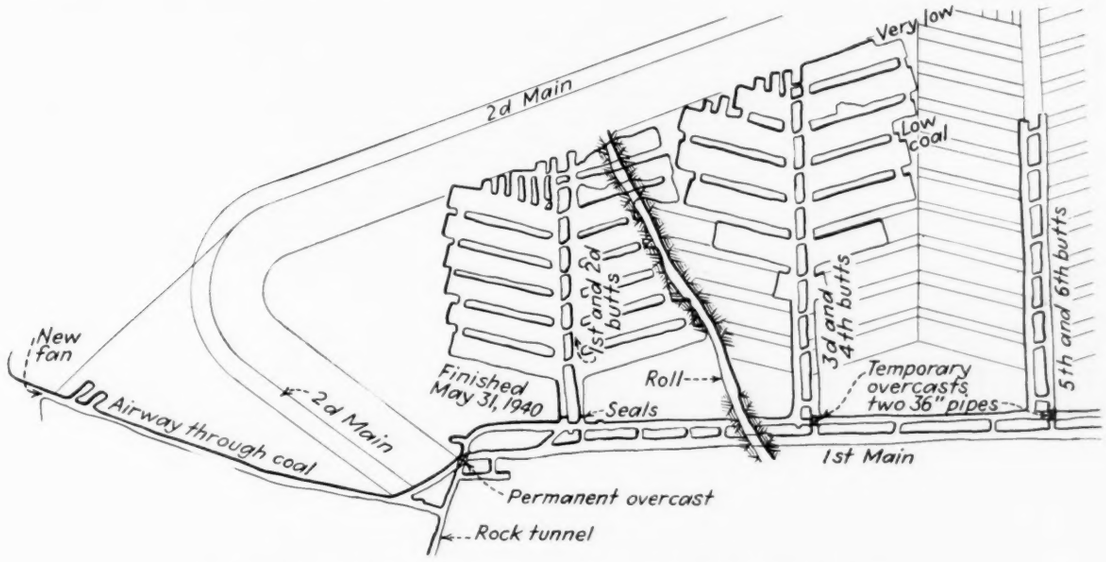


Fig. 4—The new mine makes just enough water to allay the dust of conveyor operations, but the rock tunnel, mains, butts and rooms all have natural drainage.

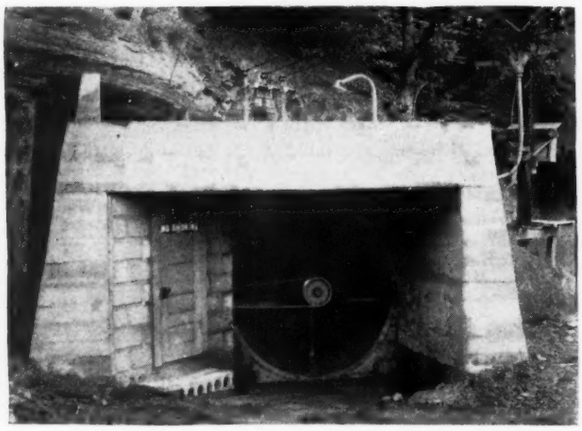


Fig. 5—New fan, and on the pole at the right are the cabinets for a.c. distribution meters.

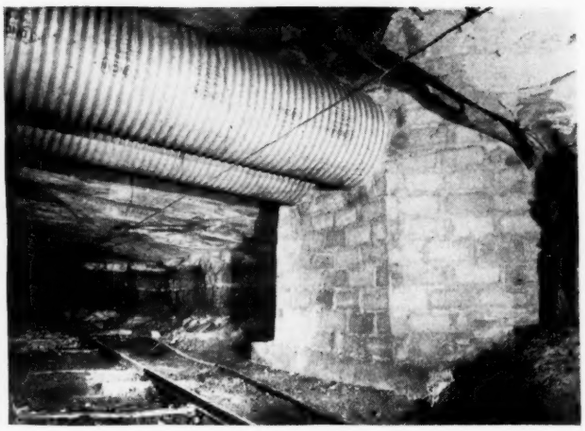


Fig. 6—These overcast steel culverts at 6 Butt will be relocated on finishing and sealing panel.

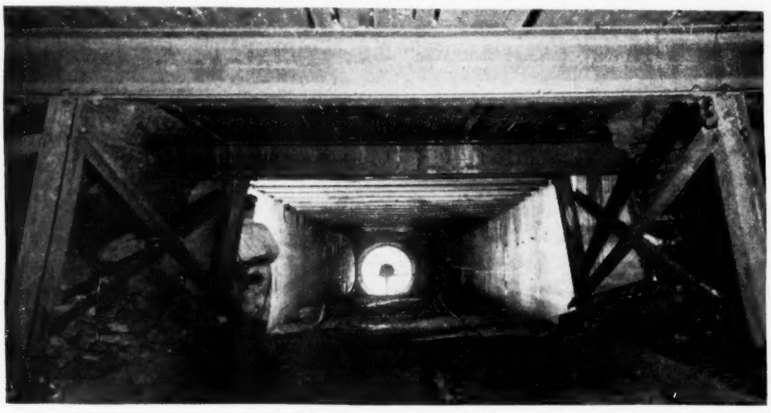


Fig. 7—Looking out at the new fan. The main power cable lies on the floor and a tight lagging of steel rails protects the top.

Fig. 8—Loading onto the conveyor in No. 3 room off 4 Butt, where the coal is 33 in. thick and carries the typical hard parting near the center.

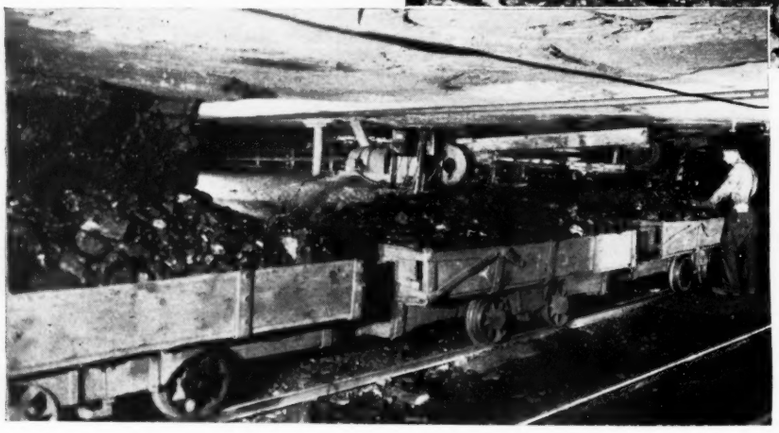


Fig. 9—Belt discharge at 5 Butt. A single-conductor cable from this station gives the boom man control of the room conveyors.

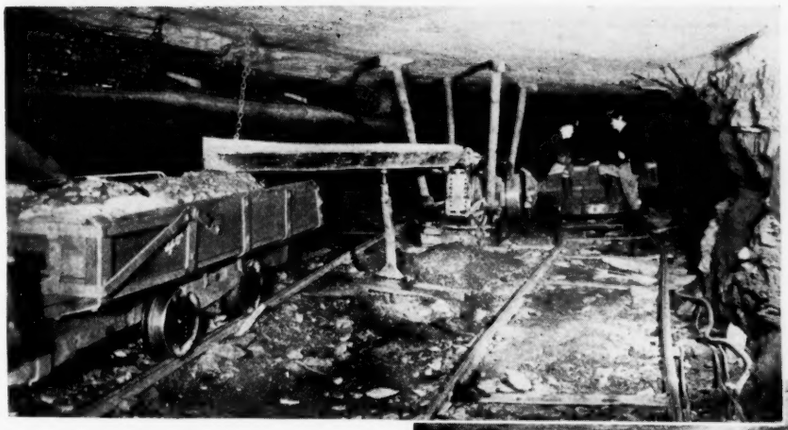


Fig. 10—Self-loading shaker conveyor loading rock from the bottom over a 300-ft. lift of main heading. In the background, C. C. Youell, mine foreman (left), and H. W. Renfro, superintendent, discuss daily problems.

Fig. 11—Elevator from the main aircourse chain conveyor. An entry gang on the post at the left serves as connector and junction for 440-volt cables.

Fig. 12—2,300-volt cable in coal-rib trench feeds transformers in crosscut. Overload oil switch protects 440-volt distribution and transformer windings.

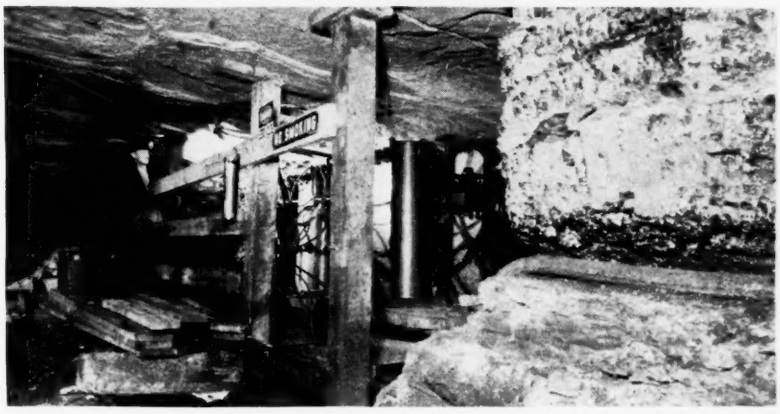


Fig. 13—Simplicity, reliability, light weight and safety were objectives in design of these gangs.

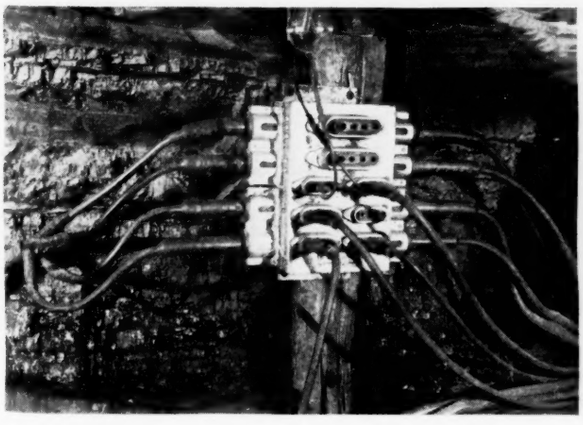


Fig. 14—At face conveyor, showing control reel with snap switch on top, room gang on post and conveyor controller.

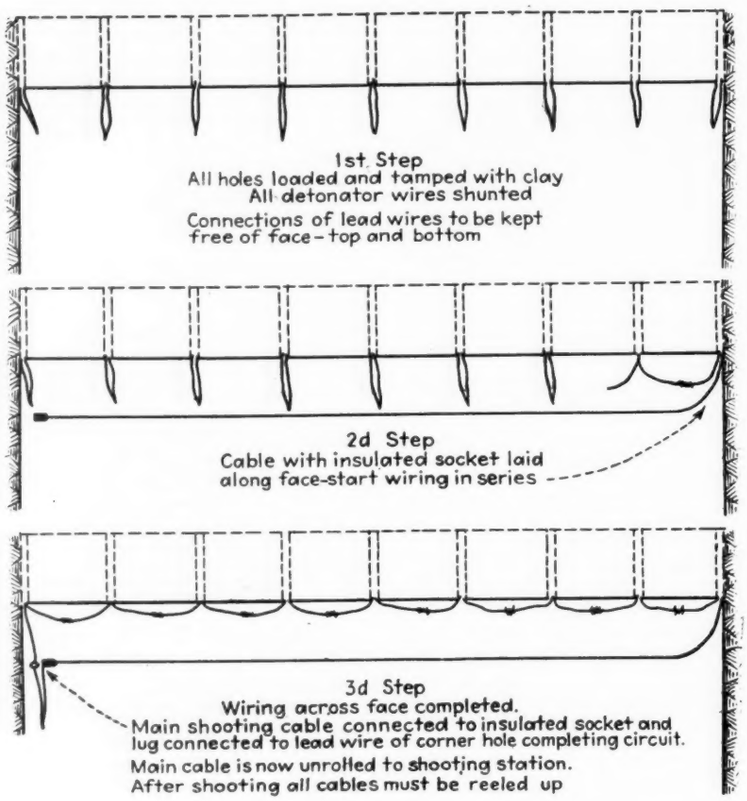

1st Step
All holes loaded and tamped with clay
All detonator wires shunted
Connections of lead wires to be kept
free of face-top and bottom
2d Step
Cable with insulated socket laid
along face-start wiring in series
3d Step
Wiring across face completed.
Main shooting cable connected to insulated socket and
lug connected to lead wire of corner hole completing circuit.
Main cable is now unrolled to shooting station.
After shooting all cables must be reeled up

Fig. 15—Wiring instructions for multiple shooting on shift. Usually thirteen holes are used per cut in a 75-ft. room.

Junctions and cable connections are made in specially designed boxes of two types, termed "entry gang" and "room gang," respectively. All cables contain ground wires which are connected through the gangs, as are the power conductors. These ground wires terminate in connections to the frames of the motors driving the blowers, drills, conveyors, cutters, etc. The main ground in the power cable terminates in a mass of copper buried several feet below a creek bed near the fan location. Securityflex Type G 133-strand Anaconda cable insulated for 600 volts is used for the 440-volt distribution.

Entry Cables in 250-Ft. Lengths

Entry cables are size 1/0 and are purchased in 250-ft. lengths with Miller single-pole connectors vulcanized to each conductor and to a merging of the three ground wires. The length attached directly to the transformer station is an exception in that one end is fitted with screw-clamp terminals for connection to the transformer buses. The 250-ft. lengths are attached to each other through Miller connectors to form an entry cable of any required length from 250 up to 2,000 ft.

Care has been taken to make the distribution system as safe as possible. All female connectors on cables and gangs point away from the source of power and, if unattached or exposed, are always dead. All male connectors point toward the source of power and, if unattached or exposed, are always dead. It is unlikely, therefore, that a man can be shocked in making any sort of connection unless he deliberately sticks his finger into a female connector. One, two or three prominent bumps or warts on the single-pole connectors of the entry cables and on the cases of the entry gangs facilitate making proper connections for consistent phasing. Ground connectors on these entry cables and gangs are reversed: i. e., the end of the cable having three individual conductor male connectors has a female ground connector. Thus an interchange between a power and a ground connector is impossible.

Room cables for transmission from entry gangs to room gangs are size No. 3 in lengths of 300 and 350 ft. Each room cable has a four-pole male connector on one end for take-off from a four-pole female connector on the entry gang, and a female four-pole connector on the other end for attachment to a four-pole male connector on the room gang at the working face. Cables attached to various pieces of machinery have four-pole male connectors vulcanized to their free end. The ground plug and its matching socket on all four-pole connectors are larger in diameter than the conductor plugs and their sockets so that there can be no phase interchange or mixing of ground and conductor. Four types and sizes of Miller connectors are used: the large single type on entry cables, a small single on the control system, a large four-pole for room and mining-machine cables, and a smaller four-pole for conveyors, drills, blowers, hoists, etc.

Fig. 13 shows the close-up of an entry gang normally used for room-mouth installation but in this particular case on the main heading. Connections on the sides of the gang are for entry cables. Those on the right bringing in the power are males on the gang; those of the left taking power to another junction are females. The two large four-pole sockets on the face at the top are to accommodate room cables; the six smaller sockets below are for blowers, room conveyors and extra service.

A room gang in use at the working face is pictured in Fig. 14. This type has two large four-pole connectors at the top; one is a male for receiving the room cable and the other is a female for the mining-machine cable. The three smaller female sockets serve for face conveyor, drill and extra service.

Conveyor Control Coordinated

A single-wire control system coordinates operation of the room conveyors with the belt upon which they discharge. This wire starts at a connection to a belt motor lead in the belt starter and extends up the butt entry. At each room mouth, this single wire is plugged into one conductor of a two-conductor cable; this cable extends to the working face on a reel, as shown in Fig. 14. A snap switch on the reel connects the two conductors in the cable. At the mouth of the room the other conductor in this cable is connected to the room-conveyor starter.

Operation of the control system is as follows: When the entry belt is started, an energizing current passes up the single wire, thence to the face of all rooms through the snap switches at the faces and back to the room conveyor starters at the room mouths, starting the room conveyors.

When the belt is stopped, all room conveyors discharging onto it also are automatically stopped.

The snap switch and reel at the face give the face crew control of their room conveyor. By turning the switch to the "off" position they break the energizing current and stop the conveyor. It cannot be put back into operation until their face switch is put back into the "on" position. This eliminates the necessity of keeping a man at the mouth of the rooms and adds greatly to the safety of the operation since there is no possibility of an unwanted starting up of the room conveyor. The face conveyors are under the exclusive control of the face crews.

At the belt-control station on the main heading, the control wire passes through a pushbutton switch so that the boom man can control the room conveyors without necessarily stopping the belt. There also is a padlocked selector-switch which will energize the control wire directly from the line instead of from the belt-motor leads. This switch is kept locked out and is used only during certain phases of the delivery of supplies when it is desired to operate the room conveyors in reverse and it is not necessary that the belt be running. This control system extends to all working faces and has worked flawlessly.

A telephone circuit is provided with stations at all loading points and on butt entries at the mouths of rooms. An Anaconda BB Duraseal No. 16 two-conductor twisted cable is used for this circuit.

Distribution metering is provided in the a.c. power connections to the mine. As shown in Fig. 5, the pole at the upper right carries a combination watt-hour and demand meter in the primary 2,300-volt circuit. Another meter in the fan-motor house records the power used for ventilation. During a recent month when the mine was operating about 50 per cent of present capacity and produced 9,045 tons, 61,800 kw.-hr. was purchased to run the entire mine plant including tipple, coke crusher and larry, and town lights. Of this total, 21,800 kw.-hr. entered the mine on the 2,300-volt primary feed cable to supply all inside machinery except main-line haulage motors. This was 2.41 kw.-hr. per ton. The fan that month used 2,460 kw.-hr.

Except for a 24x60-in. single-roll McLanahan & Stone crusher, the tipple stands practically as when built by Morrow in 1930. All screening is done with shakers; loading is done to three tracks with two booms and one chute. Coal for beehive coke is crushed by a 54x60-in. Williams hammer mill.

The Wise Coal & Coke Co. is one of a group controlled by J. L. Kemmerer, Jersey City, N. J. This group includes the Kemmerer and Gunn-Quealy coal companies of Wyoming, Rich Hill Coal Co. of Pennsylvania and Kemmerer Gem Coal Co. of Virginia. Mr. Kemmerer is president of Wise. R. S. Graham, Norton, Va., is vice-president; H. W. Renfro, superintendent; C. C. Youell, mine foreman; W. M. Jenkins, mining engineer. Co-author J. B. Taggart, who played a large part in the planning and design of the mine, is now located in Charlotte, N. C., with Whitney & Kemmerer, Inc., sales agents for the Wise and Kemmerer Gem coals.

BOTTLENECKS ELIMINATED

In High-Speed Mechanical Loading

By Modernizing Transportation Facilities*

By E. H. JOHNSON
Manager Loading-Machine Division
Jeffrey Manufacturing Co.

FIFTEEN YEARS ago, machines loading 400 tons per nine-hour day in West Virginia and big mine cars holding five, six, and seven tons of coal were something to shoot at. Today, we have cars that carry 10 tons away from the face, loaders that produce 700 to 800 tons in a seven-hour day, cutters that mine 1,200 tons. Big figures have become commonplace. We are more likely now to look behind the big figures and ask whether such performances are uniform; if these things are done with due regard for our newer conception of mine safety; how many tons a man on the section is worth, and how many dollars is invested per shift ton of production.

Once in a while, a condition arises where with good mining conditions it becomes possible to provide equipment that will not only fit the mines but will also dovetail with available mine equipment. Add this to good maintenance and supervision and the flow of low-cost coal becomes almost automatic. When the cutting, drilling, loading and gathering of coal can be accomplished with units that are flexible and of large capacity and when the capacities are well balanced, it has been found possible to obtain section labor cost as low as 20c.

Most mines do not fall in this class. The usual bottleneck to smooth production is the size of the mine car,

* From an address entitled "Man Tonnage and Mechanical Routine," delivered before the Illinois Mining Institute, Springfield, Ill., Oct. 25, 1940.

which often is too small for efficient gathering from high-capacity loading units. This has proved to be a most baffling problem, not only in Illinois but in many parts of the country. Shaft size is one limitation and, because of the size of investment, the large number of cars to be changed is another.

The first and most general method of attacking this problem in this field has been to keep the switches close, using back switches and extra locomotives to reduce the car-change time. Some have been able to cut average car-change time to less than a half minute by this method. By use of back switches and a 3½-ton car, one of our track loaders has recorded averages above 100 tons per hour over long periods. Under these conditions, the labor cost of laying and reclaiming section track has been moderate because of the high tonnage involved.

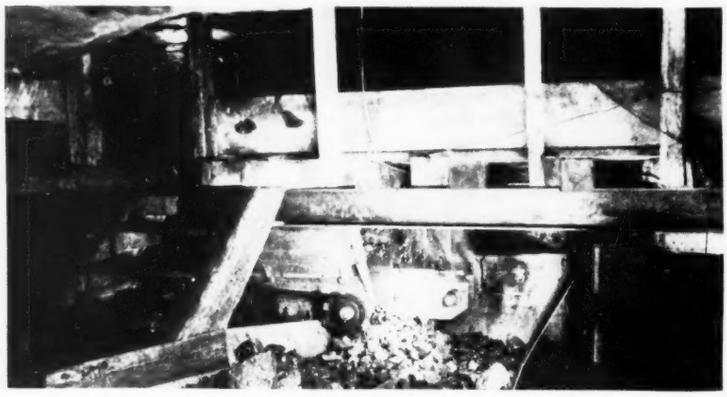
Another method combining this plan with even smaller cars is the use of a conveyor long enough to load two cars at one setting, by reaching over the inby car to load the outby car first. A time study was made in July in this field in a mine of this type where the car capacity was 2.35 tons average. In a seven-hour period 310 cars were loaded—which may be a record. The best hour showed 47 cars loaded and three moves completed. In all, 18 places, averaging a little over 40 tons each, were loaded.

The ideal solution, where possible, is to bring up the mine-car standard to that of the other equipment, using cars of 6 to 10 tons capacity. Where the coal is hoisted through existing shafts this change has involved the additional investment of an inside dump and skip hoisting.

There are two other means of accomplishing the improvement. One is by use of shuttle cars with conveyor bottoms for self-unloading, mounted either on rubber or on rails, and the other is by use of large-capacity drop-bottom mine cars for face gathering. Each of these types is used only in the working section and from them the coal is transferred to the regular mine cars for the main-line haul. Use of a few large-capacity gathering units at the face reduces the number of standard mine cars for the required output because the regular cars do not go beyond the main line or section parting.

The greatest development in this direction thus far has been shown in the trackless system. The best of the installations with a few large mine cars so far is the one at Kings Station mine, Princeton Mining Co., Indiana, where two 10-ton drop-bottom mine cars each with a 6-ton cable-reel and trolley locomotive serve one loading machine. Some of the working faces are 2,000 ft. from the transfer station. For these longer runs a third unit is added to prevent loss of time for the loader. Two of these cars will keep a loader busy within a quarter mile of the transfer point.

In the earlier development of tractor-trailer cars there was considerable objection to the installation expense of the dumping points. These had to be frequently moved because of the limited radius of operation feasible with trackless units. A large item of this cost was the excavation of a deep pit. The self-unloading shuttle car overcomes the pit expense, but suffers loss of time in the unloading operation, which has the effect of restricting further the effective operating radius.



Discharging coal onto conveyors.

Conveyor lies under delivery track, elevated 4 ft.

Save Dump-Pit Expense

At Princeton Mining Co. we installed two parallel units of standard underground portable conveyors and laid them not in a pit but directly on the mine floor and elevated the track just 4 ft. The conveyor, which is 42 ft. long, lies directly under the delivery track in the entry paralleling the regular haulage. This delivery track beyond the conveyor in each direction goes down at a convenient grade of about 10 per cent to the normal position on the entry floor. The sides of this double conveyor are built up to form a bin which holds 20 tons of coal. A similar double conveyor receives the discharge of the floor line conveyor unit and elevates the coal through a convenient crosscut to discharge into the standard mine cars on the parallel entry. In this case the elevating conveyors are 47 ft. long.

At present, this unit, which is controlled and operated by one attendant, is handling about 1,700 tons per seven-hour shift, operating two shifts per day. Four loading machines are tributary to this loading point. Coal is handled through this unit at an average rate of 9 tons per minute. The conveyors are running about 45 per cent of the day at present. The quantity of coal handled per shift will soon be increased by the addition of another loader unit. The material to be

handled in this present location is about 500,000 tons.

The percentage of the shift employed in loading time with standard mine cars was formerly 51½ per cent of the shift, which with 3½-ton cars and high-capacity loaders is recognized as unusually good. The larger cars have increased this effective loading time to 64 per cent and more than doubled the ratio of loading time to changing time. Several similar setups are being located now in other mines—in one case with a maximum haul to the loading point of 4,500 ft.

Other economies show up and result in higher man-tonnage for the loading crews. Mounted cutting machines have the capacity to cut the extra coal. Back switches are not needed for high-speed car changing, and the same track crew handles the increased tonnage. Actually, three-quarters of one man-day is saved per crew while the output per crew has gone up 25 per cent. It can readily be appreciated that many mines have much smaller mine cars and support an operating routine for their loaders far lower than 51½ per cent. We expect to see unit tonnages doubled in some cases and man tonnages increased by at least 50 per cent instead of 33 per cent, as the figures show here.

Topworks at Kings Station mine, Princeton Mining Co.

Any time that man tonnage on the section is less than 30 in the Illinois No. 6 mining conditions, there is room for substantial improvement. The development described may make such improvements possible for shaft mines now handicapped by inadequate cars without radical changes in mining methods or equipment and at a very modest capital outlay. The capital outlay for new equipment in this case is below $10 per ton of production per shift.

MODERN CONVEYOR OPERATION

Develops Roof Control System

Delaying Squeezes at Scandia No. 4 Mine

By C. T. CARNEY
President, Scandia Coal Co.
and
CHARLES H. LAMBUR JR.
Assistant Editor, Coal Age

PIONEERING modern mechanized mining in Iowa, the Scandia Coal Co., Des Moines, four years ago began installation of chain conveyors. There were many problems concerning their use which had to be solved and labor readjustments which had to be made. An unlooked for achievement was the development of a roof control method that delayed squeezes. This system of conveyor mining, as compared with former hand-loading methods, has allowed rooms to be increased from 150 to 200 or even 300 ft. in depth and widened from 22 to 35 ft., which, with a 12-ft. slab, makes a total of 47 ft. room width. Room centers were increased from 35 to 53 ft., pillars reduced from 14 to 6 ft., and panels extended to any reasonable desired length.

The old method of mining had changed but little in the past 50 years and it was evident that to remain in business a more economical system must be found, as it was impossible to compete with mechanized States and lower-cost coal. Conveyor installation at the No. 6 mine brought immediate problems with both their coordination and man-power. Experience, however, soon showed their use to be practical. Feeling this equipment could be more successfully employed at No. 4 mine, at Madrid, Iowa, it was moved there. Additional units also were installed and their usefulness became increasingly apparent.

It was recognized that mining methods had to be adapted to the conveyors. Experiments with different

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sized pillars, room widths, cleaning coal before loading, etc., were carried on. As work advanced the ever-present squeeze was encountered, as with hand loading into cars. Rather than waste coal by leaving large pillars, a roof-control system was adopted which delayed squeezes.

Study was made of a wage scale to cover conditions and rates of pay for conveyor working in the district and the national union officers were cooperative in its formation for the State of Iowa.

How mechanized mining can be applied to Iowa operations is shown by the installation of conveyors at Scandia Coal Co. For four years the company has pioneered this development. Adaptation of mining methods to conveyors led to a system of roof control that has delayed all squeezes.

The No. 4 mine, opened in 1918, is one of the oldest mines in Iowa and for years was the largest producer. Coal is hoisted 350 ft. through the double-compartment shaft and is shipped on the C. M. St. P. & P. RR. Output averages 1,050 tons per day and is produced from both hand- and conveyor-mining sections by 325 employees. Working faces are 4 miles in and 40- to 60-car main-line trips are hauled to the outside by 7- and 10-ton Goodman and General Electric trolley locomotives. Cars are of both wood and steel, end dump, with capacities of 1¼ and 2 tons. Main haulageway is timbered with three-piece sets on 3½-ft. centers and lagged on both top and sides for 95 per cent of the distance. Timber cost is 7¢ per ton.

Two seams, both known as the "lower," though separated by 15 to 20 ft. of shale, are being mined. The top seam averages 2 ft., and the bottom, in which conveyor mining is done, averages 3½ to 4½ ft. There is little dip to the seams, which occur in meandering fingers that seldom are over ¼ mile wide. Bottom is both fireclay and sandstone; top is shale.

The conveyor panel plan is to drive two pick-work entries, turning seven rooms off each entry at 90 deg. angles (see Fig. 2). Two additional openings, called skip entries, are driven 18 ft. off and parallel to each pick entry. Room necks are 10 ft. wide between pick and skip entries. Beyond the skip entries rooms are driven 35 ft. wide with the inby rib on line with the inby neck rib, except for No. 7 room. This places each room conveyor along the rib to be slabbed. Breakthroughs are on 50-ft. centers and cut by machine for travelways.

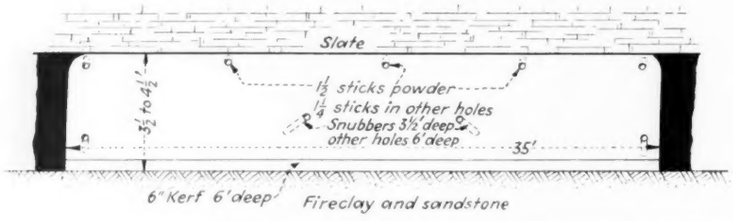


Fig. 1—Drilling plan for 35-ft. room in conveyor mining. Roof rib holes, for roof control, are drilled on 12-ft. centers from the same set-up as for face rib holes and are loaded with two sticks of powder each.

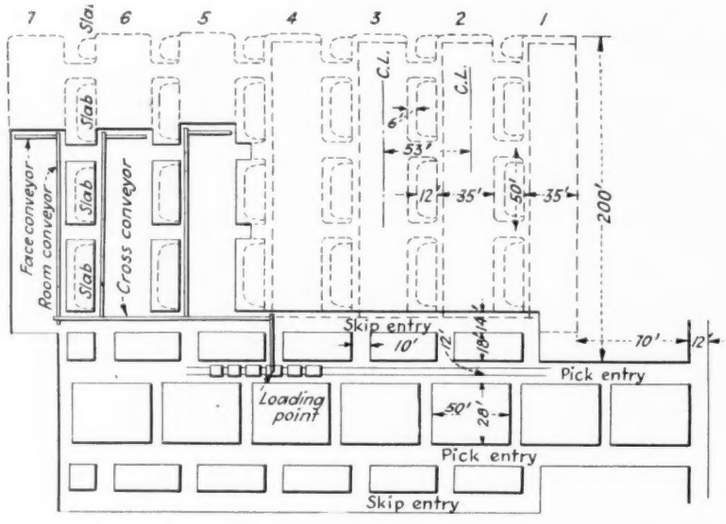


Fig. 2—Sketch of one side of panel seven rooms deep, for chain flight conveyor mining.

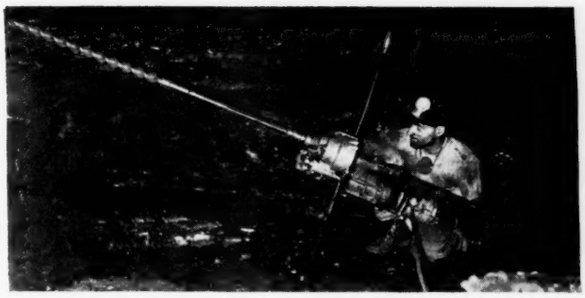
Work Three-Room Units

Mining plans call for development of pick and skip entries before driving rooms. Both sides of the panel are not necessarily worked at the same time. To comply with off-shift shooting, a unit of three rooms is worked by a crew of two mining-machine men, one driller, four shovelers, one timberman, and one car trimmer who also spots cars for loading. Three such units of three rooms per unit are in operation and under direct supervision of a foreman and assistant. A floating crew of one repairman and one electrician maintains equipment for the three units.

Under ideal conditions rooms 7, 6 and 5 are worked first, with room 4 as a stand-by for work while equipment is being set up in 3, 2 and 1. Mine cars are loaded at one point (Fig. 2) during the entire working of the seven rooms, except when development is slow. Then a temporary loading head is placed at room 1 or 2 in order to get production.

Each working room contains a Jeffrey Type 61-HG 16-in. face conveyor emptying onto a Type 61-AM room conveyor. The room conveyor feeds onto a cross conveyor in the skip entry which empties into No. 4 room conveyor, extending to the pick entry, where mine cars are loaded. Cars are spotted by a Sullivan car hoist. In retreating each room, two slabs are undercut 6 ft. each and are mined from the rib next to the conveyor. Slab coal is hand-loaded into the room conveyor and to eliminate double shoveling for the second 6-ft. slab a portable Jeffrey conveyor will be used. The rooms only are slabbed above the skip entry and when completed are 47 ft. wide with a 6-ft. pillar.

Rooms are timbered with 4- to 6-in. props and cap pieces set on 3- to 4-ft.



Left—Drilling rib-roof holes. Right—Inby side of props at room mouth, showing how roof action has been controlled.

centers. They are carried to the face on the room conveyor by reversing its travel direction. Outby, along the face conveyor, props are set on 2-ft. centers and safety props are set at the face. After each fall of coal is loaded out the face conveyor is dragged forward by the four shovelers and the timberman immediately sets props.

Each room is equipped with a No. 1 bronze-wheel-fan Jeffrey blower, operated by a 1-hp. motor, delivering air to the face through tubing. Jeffrey 35 BB shortwall mining machines, equipped with 7½-ft. bars and 10-position chains, carrying star-wedge heat-treated bits, do all cutting. Jeffrey A-6 and Little Giant electric drills, using both Dooley and Hardsocg augers, with special tempered Hardsocg bits in a mole-foot head, drill 2¾-in.-diameter holes — nine holes per face (Fig. 1). Each is loaded with 1½ to two sticks of No. 3 2x8-in. du Pont pellet powder. The mine is non-gassy.

The seven-room panel is used only because it fits the previous mining plan. However, a previously unknown acreage of excellent quality coal was found beyond one of the panels, and, as the tonnage was needed, it was decided to try for its recovery. To do this, some method of delaying squeezing was necessary.

It was noticed that when a room was left standing, the roof often would break along the ribs, which action was thought to be caused by mine air. Management did not accept this theory but considered the roof as a beam held in place by the pillars. After slowly sagging in the middle a room roof would begin to break along the edge of the support. If the pillar was of insufficient thickness, the roof, taking weight, would fail to break, thus causing the pillar to crush and creating a squeeze. It was reasoned that if the roof was made to break, weight would be removed from the pillars.

With this in mind, as the room is advanced, after making the face rib holes on every other set-up, the drill is tilted upward and an 8-ft. hole put into the roof on 12-ft. centers along each rib. Also, roof holes are put across the face after the room is driven. After slabbing and removal of equipment the holes between the last breakthrough and face are fired. Two sticks of pellet powder are used per roof hole. Across the room mouth at the skip entry 6-in. props on about 9-in. centers and about 15 ft. deep are set. The rest of the roof holes are shot and the top falls to the skip entry, where these props stop the action and keep the entry open. Each completed room is shot in. Without control the room roof bends at the pillar edge and weight rides over the pillars. Shooting rib-roof holes causes a shear and removes some of the weight from the pillars. To date, the experimental panel has been extended to twelve rooms, and the limit, if there is one, is unknown. Room props are not recovered. The system of roof control may not be 100 per cent perfect but it is known that because of it more rooms can be mined with a greater recovery of coal.

A Borehole Record Showing Typical Strata Overlying the Seam.

Material	Feet	Inches
Clay	8	..
Drift	103	..
Slate	9	6
Coal	..	6
Light shale, sand rock	30	..
Mixed shale	15	..
Light shale	12	..
Mixed shale	10	..
Light shale, sand rock	27	..
Mixed shale	8	..
Slate	5	..
Coal	1	..
Light shale, sand rock	30	..
Light shale	19	..
Slate	10	..
Coal	..	6
Light shale, sand rock	9	6
Slate	9	..
Coal	1	..
Slate	4	..
Coal	2	..
Light shale	3	..
Slate	14	2
Coal	4	6
Total depth	335	8

Face conveyor discharging onto room conveyor.

DUCKBILL, CLAY CUTTING

Rotary Cutter and Hydraulic "Shooting" Given Careful Test at Bras d'Or, Nova Scotia

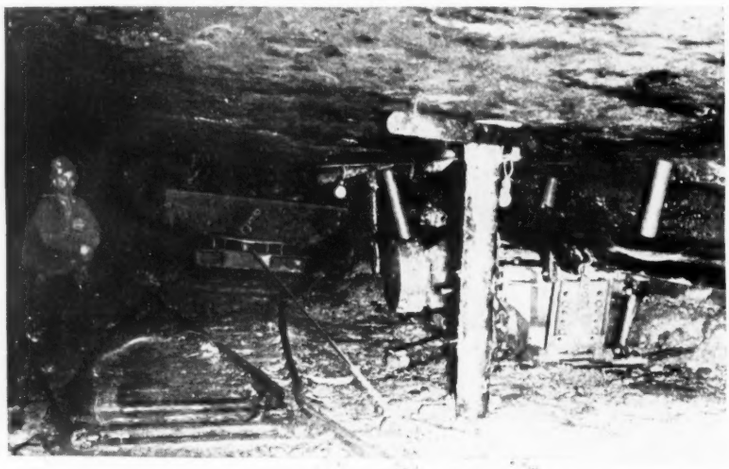
By R. DAWSON HALL
Engineering Editor, Coal Age

DUCKBILLS, hitherto restricted in their application to certain parts of the United States, are being tried out with other distinctively American devices and some British in the new Franklin mine of the Bras d'Or Coal Co., Nova Scotia. The coal is being undercut in the clay floor, drilled by electrically driven augers, forced down by the concerted hydraulic pressure of fourteen small pistons placed in the borehole, loaded by a duckbill onto shaker chutes, discharged into bottom-dump cars, which are placed by a car hoist, run by gravity to a slope and thereon hoisted to the surface.

These innovations are being made in a coal field that long has been noted for its readiness to undertake leadership in mining methods and equipments. The oldest coal field on the American continent, except that perhaps in New Brunswick, it has always been distinguished for its willingness to adopt new methods. In general, these advances have been based largely on British practice. This departure, in contrast, has, in part, "gone American."

So far, the operation in all its details is purely tentative and developmental. Efforts are being made to fit it into the restrictions imposed on it by local conditions which are in many ways difficult for either hand labor or any kind of mechanization.

This mining plant is located at Bras d'Or, about 20 miles to the northwest of Sydney. The seam worked, locally known as the Greener or Upper Jubilee, pitches persistently about 10 per cent in a direction north 25 deg. 30 min. east, a uniformity in pitch little changed by distance, quite characteristic of these Sydney basin beds. The seam has a smooth floor, but the roof rolls with great irregularity; coal thickness averages 3 ft., varies from 2 to 4 and even 6 ft.



South level showing loaded car being pulled from airway prior to being dropped down the gradient to the slope.

Surface operations and slope at the Franklin mine have been inexpensively constructed, as the mine now is being worked more as an experimental than a commercial proposition and most of the output is sold for local domestic use. How the coal will be conveyed to the shipping pier, which is about one mile away, has not been decided. The Lower Jubilee seam is being worked at the Colonial mine of the same company and the workings underlie those of the Franklin, being about 180 ft. below. The old Colonial mine, started by the General Mining Association 103 years ago, was abandoned by that company for lack of title.

Roof Rolls Wildly

A wildly rolling sandstone roof, extending to the suface and making a strong top, lies above the Upper Jubilee bed, but between this top and the coal frequently is found from 1 to 5 in. of a slaty material known as a "falling" or "following stone" with no strength or permanence and lying in irregular lenses, sometimes slickensided, but always loose and ready to fall. The underside of the sandstone looks like the waves of a rough sea. As soon as the coal falls, this mediate roof, wherever it occurs, as it does over perhaps half the area being mined, falls also, covering the coal and must be loaded before other work is done. However, being of livid color and free of bone, the larger material is readily separated.

Under the coal is a soft fireclay which, fortunately, does not roll and which the bits in cutting reduce almost to powder, though 3 ft. below the coal the demineralizing action of the vegetation in the peat bog began to cease, and the rock is still quite hard to drill and shoot, but this stratum need not be disturbed.

Using a radial cutter to advance a room neck.

For a distance of 2,000 ft. from the surface, the coal has been opened by driving a pair of headings down the full pitch of the seam. From this slope no entries have been driven, except a pair of development headings —hereinafter referred to as levels— to the right or east of the slope that together form an entry rising roughly about 2 per cent, a gradient that enables a loaded car to unreel a light rope on a small hoist.

Both headings have been driven 600 ft., 300 of which has been advanced with the aid of the duckbill. Two rooms already have been necked on the upper side of the level and these and many others will be driven at right angles to the level and straight up the pitch, using the duckbill as the loading and transporting medium. Rooms will be 30 ft. wide and 300 ft. long with 15-ft. pillars. Whether the latter will be drawn will depend on the behavior of the roof.

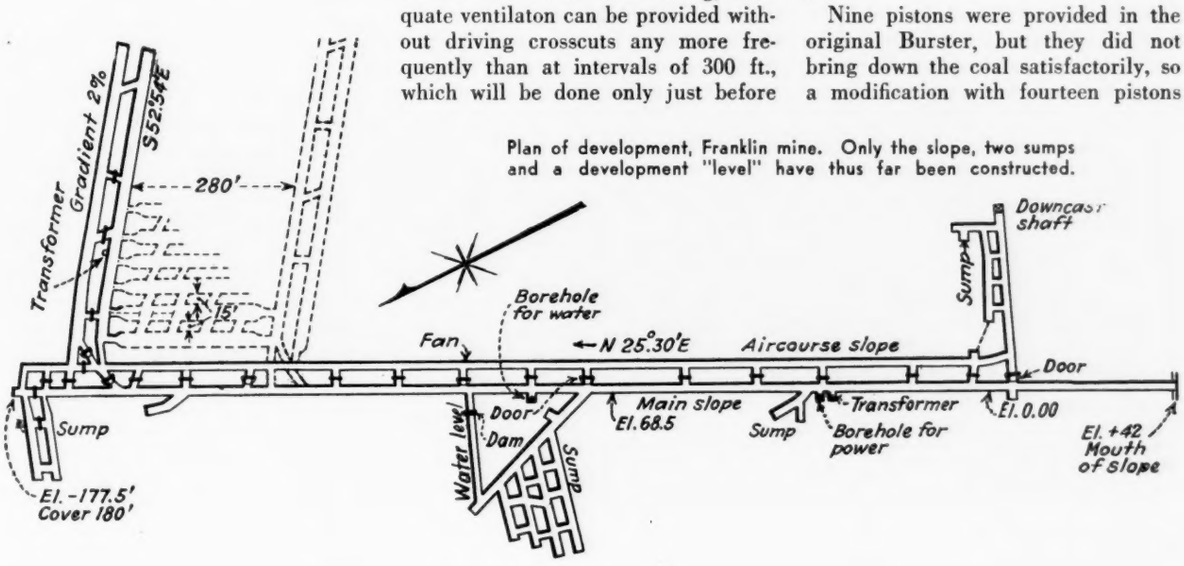
The first rooms started are near the slope, and progressively other rooms will be opened as the level advances. All room necks will be undercut with a 4-hp. Siskol electrically driven rotary-bit machine. This unit has a pronged bit which on rotation cuts into the coal. Kirvings are removed in the usual manner by the cutter's assistant. The cutter adjusts the feed and also the movement of the bit along an arc of the face by the operation of two ratchets, one for each motion. To make height in the slope and in the level a Chicago Pneumatic Little Giant drill with either a Wimet (a British tungsten steel) or a Carboloy bit is used which makes 1½-in. holes that are charged with Monobel explosive.

Coal is undercut in the clay by a Goodman 412 shortwall undercutter, making a 5-in. kerf 6 ft. deep. Throwaway bits are being used. There are 28 bits to the chain, and 13 bits or 26 points are used per cut. At the face of the duckbill operations, a Buffalo Forge 2M blower with 12-in.-diameter Mine Vent tubing furnishes auxiliary ventilation. With this tubing, adequate ventilaton can be provided without driving crosscuts any more frequently than at intervals of 300 ft., which will be done only just before the shaking-chute drive is advanced. (Two such blowers are available, but only one is in use; the other is kept as a spare.) Crosscuts will be driven about 30 deg. off the direction of the entry and will be used for transporting cars from the waterway to the haulage heading, by means of a hoist at the end of the latter.

A Gullick Hydraulic Coal Burster is used to force the coal down. It has a tube, or gunbarrel, with a series of small pistons operating at right angles thereto; hydraulic pressure, induced by a small hand pump, pushes these pistons heavily against a segmental section of steel roughly filling the lower part of the drillhole in which the barrel and its segment are placed and so dislodge the coal. This, at least at the Franklin mine, does not fall in a large solid block but in successive vertical sheets. The coal opens up also at the bedding planes. Thus, while making coal of satisfactory size, it delivers it to the duckbill in excellent shape for loading.

As the Burster is of 3½ in. diameter, a 4-in. hole has to be drilled, and this is done by a post-mounted C.P. Little Giant 700 electric drill with a molefoot bit 6 in. long set in a detachable head. All holes are 5 ft. long and, where the face is wide, as in the level heading, a center hole also is drilled 6 in. below the roof of the seam and so pitched as to touch the roof at the rear end. Such center holes are not necessary in a narrow place, but in every instance holes are drilled 18 in. from the rib on either side, started 6 in. below the top of the seam and pitched as described for the center hole. This hole, where there is one, is put under pressure first.

Nine pistons were provided in the original Burster, but they did not bring down the coal satisfactorily, so a modification with fourteen pistons



Plan of development, Franklin mine. Only the slope, two sumps and a development "level" have thus far been constructed.

was made specially by Peacock Bros. To make the barrel strong enough for this additional stress, it is constructed of stainless steel. The Burster is 43 in. long, and the first piston is about 18 in. in from the face. Coal thickness apparently does not affect its operation. To lubricate the pistons, water is mixed with thread-cutting oil or preferably with soap. A pressure of about 2,000 lb. per square inch is reached in 6 minutes, and the coal breaks.

Use of the Burster at this operation is necessary, as the coal is too friable to make a marketable product. Another advantage is entire freedom from smoke, fumes, noxious gases or even fog. Ribs and roof are not shattered. Impurities which run as partings or lenses fall largely unbroken; hence it is more readily possible to separate them intact than when they are violently thrown to the floor and thus crushed.

As the Burster does not shatter the roof, no broken roof shale will mingle with the coal unless the rock falls from its own inherent weakness. Unfortunately, the roof at this mine usually is so weak that it falls immediately or must be barred down at once for safety, where, falling on the coal, it has to be broken with sledges. As the rock is not as greatly shattered as by explosives, it can be better removed from the rock mass in loading. The condition of the roof after the removal of the coal is such that it has seemed likely that it could be secured temporarily by adjustable timber, and an attempt is to be made in this direction.

A Goodman shaker with 16-in. pans and placed in the center of the working place with an automatic duckbill swinging 15 deg. in either direction is used for loading the coal. Thus far, the best record has been three cycles in an eight-hour shift, each resulting in an advance of 6 ft. If the fall of the shale could be delayed until the coal has been removed, handling the rock probably would be speeded and a greater advance made per shift. However, the big advantage would be in keeping so much fine coal from being loaded with the rock when the latter is being removed, for rock and coal go together to the refuse dump. Usually, the rock over a cut in a single heading does not fill a car completely and pulling partly filled cars to the surface involves waste in operating time.

Coal is carried on shaking pans a maximum distance of 300 ft. and delivered to single-car trips of Sanford-Day automatic three-door bottom-dump cars holding 3 tons of coal when given a 6-in. topping. They stand 24 in. above the rail, are 6 ft. wide and 12 ft. long; rail gage is 36 in. Cars are loaded on a curve at one of the two ends of the last crosscut in the level, being spotted by a Brown-Fayro Brownie 5-hp. hoist.

The operating cycle begins with driving the drainage heading ahead 300 ft. with auxiliary ventilation, taking only the clay undercut, the dislodged coal and the falling rock, and delivering these to the mine car at the intersection of the crosscut with the heading. Then the duckbill and conveyor are moved over to the haulage heading, which is then driven forward 300 ft., delivering clay, coal and falling rock to the similar intersection in the haulage heading. Meantime, the drainage heading is made the desired height by lifting bottom over the 300 ft. of heading recently advanced. This is loaded in the cars by hand. Later, a duckbill will be provided in each heading, greatly speeding operation.

Summary of Time Study

Performance	Man-Minutes	Percentage
Cutting and setting bits	90	3.8
Cleaning kerf	200	8.3
Drilling	80	3.3
Breaking down coal	62	2.6
Timbering	45	1.9
Brushing and loading rock	630	26.0
Picking impurities	170	7.0
Loading coal at face	485	20.2
Car trimming	228	9.5
Handling supplies	40	1.7
Extending conveyors and hauling empties	157	6.5
Repairs	28	1.1
Setting drill and charging holes	106	4.4
Idle	89	3.7
	2,400	100.0

General Notes on Operation

Coal output—30 tons; per man—6 tons.
Rock output—27 tons; per man—5.4 tons.
Output per man—total, 11.4 tons.
Men employed—one cutting-machine operative, one duckbill operative, one duckbill helper, one car trimmer, one hoist man.
Width of cut—21 ft.
Holes—5; timbers—4; extra man timbering.
Coal thickness—40 in; impurities—18 in. additional.
Two clean-ups of 12 coal cars and 9 rock cars.
Car capacity, 2½ tons.
Time taken in loading coal is excessive, due to incomplete bursting resulting from loose rock.
Started cycle with rock down, place cut and loose coal at face.

Temporary tipple or bankhead at Franklin mine, Bras d'Or Coal Co., Bras d'Or, Nova Scotia.

Cars run to the slope by gravity, dragging the rope with them attached to the Brownie hoist, which later brings back an empty car. A 30-hp. hoist running at 200 ft. per minute lifts the loaded car up the slope to the top of the tipple. At present, the slope is laid with 20-lb. rail, but it will be replaced shortly with 56-lb. steel.

All these developments described are merely tentative to try out the equipment and discover the best method of coping with some difficult conditions. When market conditions warrant, a modern bankhead and screening plant will be built, or some means of transporting the coal to the Colonial surface plant for screening will be evolved.

Officers of the Bras d'Or Coal Co. are George Burchell, president; Robert Blane, secretary-treasurer; David Burchell, general manager; and James McDonald, mine manager.

7,500-KW. GENERATOR

Plus Two New Integral Boilers Added to Union Pacific's Rock Springs Plant

By H. C. LIVINGSTON
Chief Engineer
Union Pacific Coal Co.

ROCK SPRINGS (Wyo.) power plant of the Union Pacific Coal Co. develops electrical energy for all mines in the Rock Springs coal field as well as for domestic use. The Union Pacific Coal Co. operates fully mechanized mines at Rock Springs, Reliance, Winton, and Superior, all within a radius of 25 miles of the plant. There also is a limited number of commercial mechanized mines in the same area.

The present plant, as remodeled in 1936, consists of six 260-hp. long-drum water-leg horizontal tubular boilers operating at 150 lb. pressure with superheat at about 460 deg., fired by means of underfeed stokers. These boilers serve as "stand-by" or relief equipment for two 75,000-lb.-per-hour integral steam generators, one operating at 400 lb. pressure and 700 deg. F. temperature, and one unit operating at 150 lb. steam and 400 deg F. temperature.

Steam at 400 Lb. Pressure

The two integral-type boilers are identical in construction with the exception of the superheater surface. Provisions have been made to install additional superheater surface in the low-pressure boiler at any future time; this change, together with changes in safety valves, piping, etc., will make possible the operation of both boilers at the desired 400 lb. pressure. The boilers are fired by pulverized fuel served by two pulverizers per boiler.

Present generating equipment consists of three 2,500-kw. turbo-generators operating in connection with jet condensers. These units operate at 150 lb. steam pressure. There also is a 5,000-kw. turbo-generator equipped with a 7,000-sq.ft. surface condenser. This unit operates at 400 lb. steam pressure at 700 deg. F., and is provided with two extraction points for feed-water heating. The feed-water-heating equipment consists of a shell-and-tube high-pressure heater driven by extraction steam at 65 lb. absolute, which delivers the feed water to the boilers at 285 deg. F. There is an open-type deaërating heater operating at 15 lb. absolute, which derives its heating steam from an auxiliary turbine exhaust augmented by extraction from the 5,000-kw. turbine.

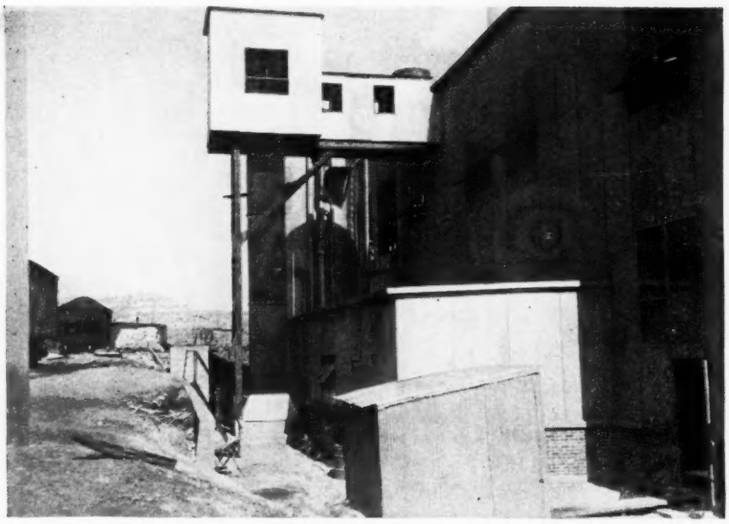
Among other auxiliaries in the plant are boiler-feed pumps, both turbine- and motor-driven, induced draft fans, turbine- and motor-driven, and forced-draft fans, motor-driven. The fans mentioned are used in connection with the integral boilers. The plant was so constructed in 1936 that expansion was possible in either direction. The pipe was all headed in such a manner that it could be extended in either direction for future installations.

There also was installed in 1936 a hot-process water softener for the purpose of treating the make-up water and spray water. Due to the fact that the low-pressure turbines are equipped with jet condensers, the boilers operating at 150 lb. all have 100 per cent make-up. The high-pressure boiler, however, is installed in a closed regenerative circuit with the 5,000-kw. turbine, so that make-up for this unit is very small. As a result, no trouble has been encountered using the treated water as make-up at the temperatures encountered in the boilers.

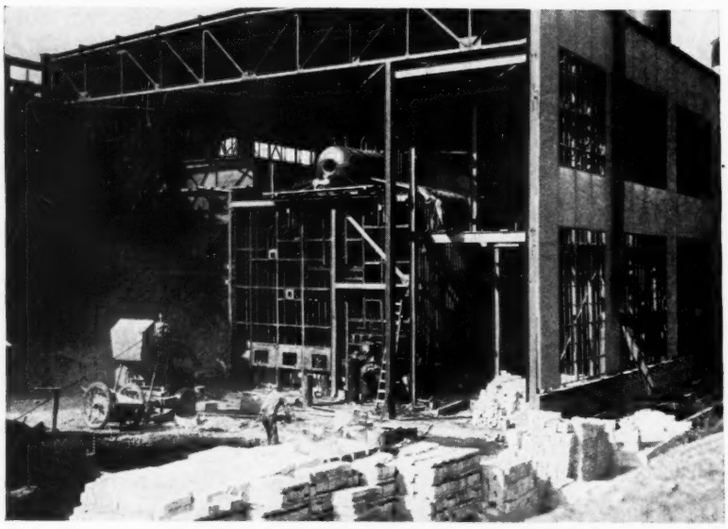
In 1940, it was decided to install additional capacity to the amount of 7,500 kw. In connection with this addition, a 7,500-kw. 400-lb. pressure turbo-generator, an 8,000-sq.ft. surface condenser and auxiliaries, and two more 75,000-lb.-per-hour integral boilers similar to the 1936 installation were purchased. Two additional boiler-feed pumps will be installed, with induced-draft fans, both to be turbine-driven, and the forced-draft fans are to be electrically driven but provided with auxiliary turbine drives. The boilers are to be equipped with two pulverizers each, one of which is electrically driven and the other dual driven.

Continuous Operation Assured

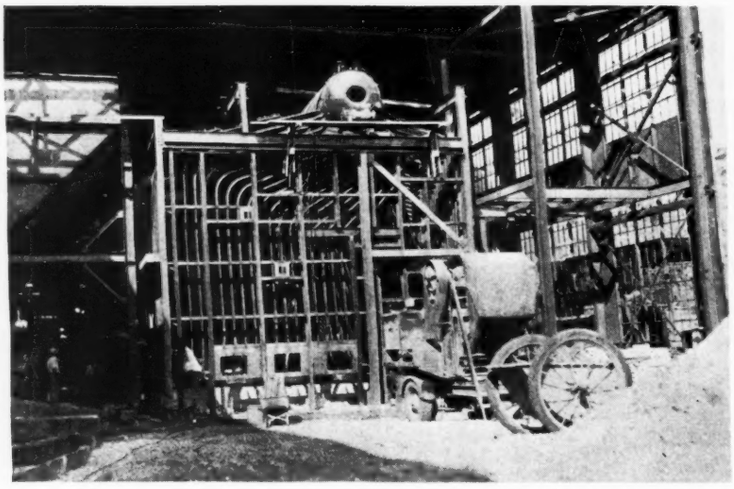
The object of the turbine-driven auxiliaries at this time is to insure against any possibility of a complete shutdown due to a "kick-out" on the electrical circuit and, as this plant is not interconnected with any other system, there would be no electric energy available for running the auxiliaries in case of such trouble. It was, therefore, deemed advisable to furnish a complete complement of turbine-driven auxiliaries to permit the plant's being started without the aid of any electric energy. Piping was extended to permit the installation of the two additional boilers, and was somewhat enlarged to take care of the 7,500-kw. turbine. It also was found necessary to add to the capacity of the spray



New coal-handling equipment to coal bunker showing track hopper and bucket elevator.



End view of boiler room under construction.



End view of boiler room under construction showing integral high-pressure boiler No. 4 and coal bunker.

pond to provide cooling for the increased output.

It is the ultimate intention to take the old low-pressure boilers out of service permanently, but it is also the intention to retain the three 2,500-kw. turbo-generators for stand-by purposes. In addition to this, it is planned eventually to convert the one remaining integral-type boiler to operate at 400 lb. pressure, making the boiler room all one pressure and doing away with the complications of a two-pressure system now existing. Therefore, in order that the existing low-pressure turbines may be utilized as stand-by, a pressure-reducing and desuperheating system to provide 150 lb. steam pressure for operation of the low-pressure turbines is being installed.

Since, as before stated, these low-pressure units require 100 per cent make-up for all steam they use, it will be necessary, during operation of these units, to supply the high-pressure boilers with a large percentage of make-up. This is not, however, thought objectionable because the low-pressure units will not operate for any great length of time for any one period.

Feed-Water Treatment Solved

Operation of the high-pressure system, with its low water make-up, presented another problem in connection with the feed-water treating. Due to the fact that the largest part of the spray-pond make-up when operating with jet condensers was supplied by the steam from the low-pressure units, when these units are shut down it will be necessary to supply the spray-pond make-up from the hot-process softener. In order to prevent make-up water from being extremely hot, it was necessary to provide a great deal of additional heat-exchanger surface to retain the heat in the water softener and to keep this heat load from overheating the spray pond.

The new plant will be equipped with 100 per cent automatic combustion control. Feed-water control on the two new units also will be of the latest type of feed-water-regulation equipment. The new plant will have a total output at a nominal load of 12,500 kw. and will be capable of carrying a considerable load in addition to this. When the plant is completed, it will be possible to shut down one of the four boilers for repair and cleaning purposes, as the remaining three boilers will be adequate to provide the maximum steam requirements of the plant.

CAN OIL-COAL MIXTURES

Be Economically Developed To Gain and Retain Liquid-Fuel Markets?

By J. E. HEDRICK
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WHEREVER the advantages of a liquid fuel are sought at a price lower than that of fuel oil, the use of oil-coal mixtures deserves consideration. At present, this use seems particularly promising as a locomotive fuel. Development of such a fuel presents technical problems, however, which may be outlined as: (1) stabilization of the pulverized coal in oil; (2) atomizing and burning the fuels; (3) grinding the coal; (4) mixing the coal and oil; and (5) economics.

A practical difficulty so far in the preparation of oil-coal mixtures has been the tendency of the coal to settle out. The rate of settling can be decreased by using oils of higher viscosity and gravity and by using finer coal. In some cases some settling may be permissible, but the coal particles must not pack tightly in the bottom of fuel tanks or other equipment. Cracked residue fuel oils are more satisfactory than topped crudes, as they seem to form more "compatible" mixtures.

Much work has been done on the addition of small percentages of "coal carriers" to the mixtures to produce stability. Three distinct types of these agents by means of which particles can be stabilized are now recognized. They are emulsions, gels, and surface active agents. Some oils need no stabilizing agent unless the fuel is heated to temperatures higher than 120 deg. F. Thus there is no stability problem in storage of the mixtures but only in handling them where they must be heated before pumping or burning.

Of the three types of addition agents mentioned, the surface active agent promises to be the most satisfactory. Its action seems to be similar to that of a protective colloid. When gels are used, the suspensions increase so much in viscosity that they are difficult to pump and atomize. If the gels are dilute or thixotropic, their ability to stabilize is materially decreased. Gels are particularly sensitive to even moderate temperature changes. In some cases, increases of only 40 deg. F. will completely destroy the mechanical strength of the gel. Emulsions likewise are so easily broken up that their use is entirely impracticable. They are extremely sensitive to temperature change and mechanical agitation. Furthermore, they produce stability only with very small quantities of coal.

It has been found that coals of a size larger than 75 per cent through 200-mesh are not satisfactory for making industrial fuels. Larger sizes cannot be successfully stabilized. On the other hand, finer coal requires much less stabilizer. At present, coal of about 98 per cent through 200-mesh seems a commercial optimum. Smaller sizes are too costly to produce and larger sizes settle too easily, particularly when the fuel is preheated. Washed screenings offer a promising source of the coal for making these mixtures.

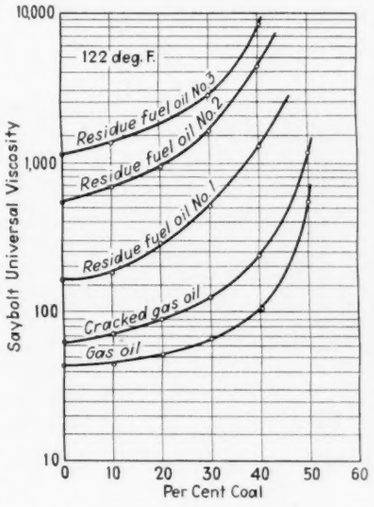


Fig. 1—Effect of coal concentration on viscosity at 122 deg. F.

The viscosity of an oil-coal mixture is a particularly important physical property as regards atomizing of the fuel. Furthermore, the percentage of coal in the mixture materially affects this viscosity. On the basis of experimental tests it is concluded that the maximum viscosity at the burner tip should not be greater than 375-500 Saybolt Universal seconds (40-52 Furol seconds) for proper atomizing. With a great many fuels this viscosity is reached automatically due to the increased temperature caused by the atomizing steam and the radiation from the firebox. With others, preheating in the fuel reservoir is necessary.

The effect of the coal concentration (weight per cent) on the viscosity of five different oils at 122 deg. F. is shown in Fig. 1. The steep slope of the curves at the higher concentrations should be emphasized. When more than 50 per cent coal is added to any of these oils, the mixture assumes properties of a solid and becomes a thick pasty mass. It is therefore concluded that 50 per cent by weight is the limit beyond which flow through pipes and burning would be unsatisfactory. With the heavier cracked residues this upper limit may be only 40 per cent. The effect of temperature change on the viscosities of these mixtures is similar to the effect on oils. The plot of an oil-coal fuel on the A.S.T.M. tentative viscosity-

temperature chart for liquid petroleum is a straight line parallel to the line for the oil flow from which the mixture is made.

The shearing action of pumping oil-coal fuels, particularly in small pipes, is sufficient to pack the coal in the lines. These mixtures can be used best where the flow to the burner is by gravity. The diagram of a satisfactory burner set-up is shown in Fig. 2. The Booth burner used in oil-burning locomotives is especially suitable for this fuel.

One of the most important considerations in the economics of oil-coal fuel is the cost of grinding the coal to the required size. The choice of grinding mill seems to lie between the ball mill and the ring-roll type mill. Both types are now quite commonly used for powdered-coal burners.

Tests on Batch Operations

In the present investigation, work has been confined to batch operation with the ball mill. An A.S.T.M. grindability mill equipped with a speed counter and special gears for varying the speed has been used. It has been found that the size and shape of the grinding mediums (balls or rods) materially affect the grinding efficiency. The mediums used in these tests are shown in Fig. 3. The 1-in. concavex balls gave the highest capacity of a size below 200-mesh, while the greatest amount of coal finer than 100-mesh was obtained when using rods ¼ in. in diameter by ¾ in. in length. The feed to the mill in each case was that used for the standard ball-mill grindability test.

A tremendous amount of work on grinding the coal must yet be done. Classification, circulating load, mill shapes for optimum capacity, and feed rates must all be investigated. An interesting possibility, also, is that of grinding the coal wet (in oil). The coal might be ground first in a dish mill to 16-mesh or finer and then fed with the oil into a ball mill. Thus the fine grinding and mixing of the coal and oil could be done in one operation. Wet grinding, however, would introduce complications in the way of fineness control, variations in dilution, and gumming up of the equipment.

Laboratory mixing of small samples has indicated that because these composite fuels are so viscous, effective mixing is difficult. Moreover, it is known that the coal is easily wetted by the oil. Although little work has

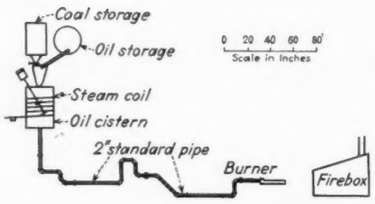


Fig. 2—Diagram for experimental oil-coal fuel system.

been done on this unit operation, the fact that it affects the cost of the finished fuel makes a detailed study desirable. It seems likely that the mixing might be done more economically by heating the fuel to about 200 deg. F. in order to lower its viscosity. Some mixing can be effected by allowing the streams of coal and oil to flow together by gravity, but it is far from complete.

Suppose it is desired to produce 4 tons per hour of an oil-coal mixture containing 40 per cent coal by weight. The physical properties are: coal—98 per cent through 200-mesh; specific gravity, 1.32; oil—9-10 A.P.I.; viscosity, 165 Saybolt Universal seconds @ 122 deg. F.; mixture—specific gravity, 1.10 @ 60 deg. F.; viscosity, 1350 Saybolt Universal seconds @ 122 deg. F. (135 Furol seconds); viscosity, 260 Saybolt Universal seconds @ 210 deg. F. (29 Furol seconds).

The coal and oil might pass to a high-speed mixing chamber and then under a baffle and up the other side completely mixed. The material actually handled would be from 16 to 20 gal. per minute. At ordinary temperatures this mixture would not be sufficiently fluid to enable it to be handled without an unusually high power requirement. If, however, the temperature were raised to approximately 210 deg. F., mixing could easily be carried out with a ¾-hp. high-speed portable mixer in a 50- to 60-gal. container.

Wide adoption of oil-coal fuels for locomotive or other industrial use will depend ultimately on their relative cost. The items making up the cost of the finished fuel are variable, particularly with location. These items are the cost of the coal and oil, freight rates, grinding, mixing and stabilizing costs. An exact value for each of these is difficult to determine. Coal and oil prices vary considerably. Grinding costs have not been adequately investigated, but estimates of the power consumption vary from 10 to 35 kw.-hr. per ton of coal, with maintenance costs on the mill from 1.5 to 10c. per ton. Not even an estimate can be made on mixing costs. By way of example, approximate values have been assumed for the various items in order to show the comparative value of oil-coal mixtures and fuel oil (Table I).

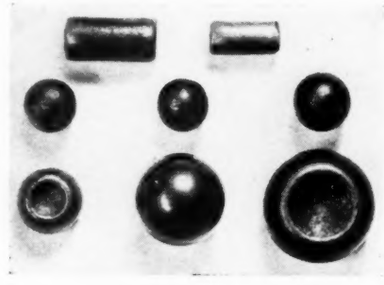


Fig. 3—Balls and rods used for coal grinding (half actual size).

Table I

Fuel Oil	
Cost	$0.50 per bbl. ($2.85 per ton)
Sp. gr.	1.0
1 ton	5.7 bbl.
Thermal value	18,000 B.t.u./lb. (150,000 B.t.u./gal.)
Coal	
Cost	$1.75 per ton
Grinding	0.16 per ton (95 per cent through 200 mesh)
Thermal value	13,500 B.t.u./lb.
Oil-Coal Fuel (50–50 mixture)	
Coal cost	$0.88
Grinding cost	0.08
Oil cost	1.42
Mixing cost	Unknown
Stabilizer cost	Unknown
Sp. gr.	1.18
Thermal value	15,700 B.t.u./lb. (154,000 B.t.u./gal.)

On the basis of these figures it is apparent that this oil-coal fuel would cost $2.38 per ton, exclusive of stabilizing and mixing, compared to fuel oil at $2.85 per ton. It should also be noted that the former has the higher heat value on the volume basis and that fuel costs per ton would be equal on the basis of thermal value when this fuel costs $2.48 as compared to $2.85 for fuel oil. In this particular case, the cost of stabilizing and mixing should be less than 50c. per ton of finished fuel in order for its use to be economically feasible.

The example given, it should be emphasized, represents a very low figure for the oil cost and a high figure for the coal price. If the coal were cheaper, or the oil more expensive, or both, the cost of the oil-coal fuel would be favorably affected. It seems, therefore, that while there are many technical problems yet to be worked out concerning this fuel, none of them is impossible of solution. Sufficient results have already been obtained to establish its commercial possibilities.

MISSOURI TRUCK MINE

With 60-Ton Per Hour Washery Boosts Capacity 300 Per Cent in Three Years

By CHARLES H. LAMBUR, Jr.
Assistant Editor, Coal Age

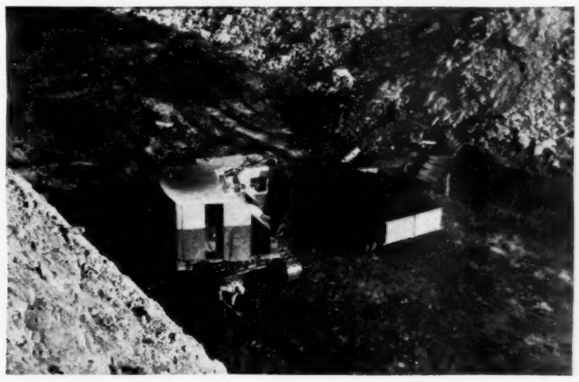
MINING the 26-in. Bevier seam, Marriott-Reed Coal Co.—a 100-per-cent truck strip mine near Columbia, Mo.—has raised its daily capacity from 200 to 600 tons in the short space of three years. Back of this record lie a continuous modernization program and an executive and operating personnel schooled by experience. A. E. Marriott, president, started mining coal more than 30 years ago with a wagon operation at Moberly, Mo. W. S. Reed, vice-president and treasurer, has been operating deep and strip mines for two decades. W. E. Marriott is sales manager.

The present property, with an original capitalization of $20,200, was opened in 1936. Preliminary to development, drilling was done and accurate logs of holes on 300-ft. centers were obtained for the original 400-acre tract. A coal and surface contour map based on these drillings showed that the seam occurred in pockets, so a multiple-pit mining plan was developed for dragline operation on the highwall for overburden removal. At least two pits always are kept open to eliminate interference of overburden with coal removal. Pits average one-quarter mile in length and are 60 to 90 ft. wide. Overburden ranges from 20 to 50 ft., with 3 to 26 ft. of soapstone over the coal.

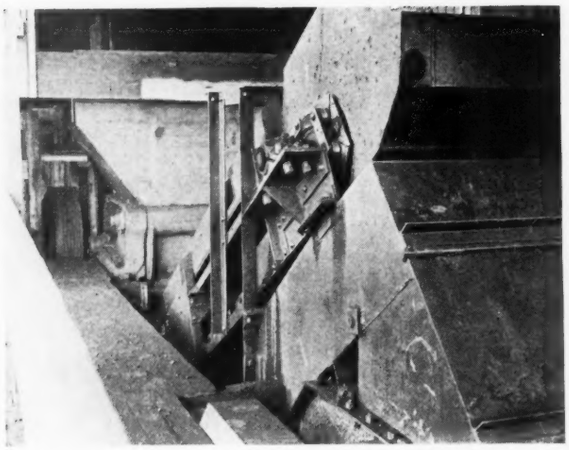
Dragline capacity has been increased from the original 3-cu.yd. bucket to 5 cu.yd. in 1937 and this year to a 7-cu.yd. Page No. 625 walking dragline. This is the first installation of a 625 featuring diesel operation with one four-cylinder four-cycle 400-hp. and one three-cylinder four-cycle 180-hp. motor. The small diesel drives a Westinghouse generator with two sets of fields for the 250-volt swing motors and one for the 110-volt light-circuit exciter. The bucket can be hoisted 286 ft. per minute and the walking speed is four 6-ft. steps per minute. Air operates controls and brakes, but swing control is electric.

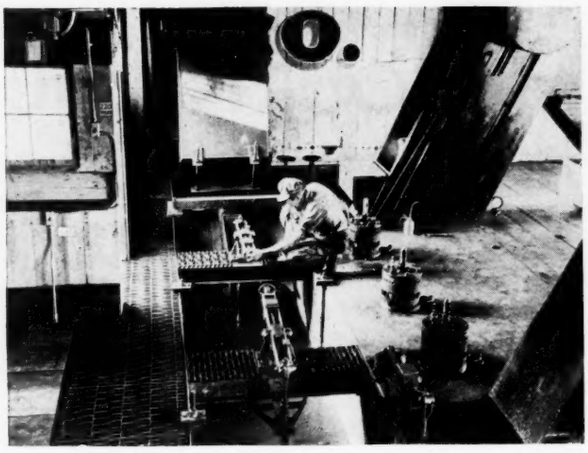
Where overburden must be blasted, 4-in.-diameter 70-ft. horizontal holes on 30-ft. centers are placed 3 to 4 ft. above the coal by a gasoline-operated sidewall drill, which can drill 600 ft. of hole per day. Holes are entirely loaded with 2½- or 3½-in. sticks of 40-per-cent dynamite. The smaller sticks are used in light overburden. The coal seam is broken by ¼-stick-per-hole charges of du Pont No. 5 pellet powder in holes on 4-ft. centers made by Chicago Pneumatic air drills with 2¼-in. Timken detachable bits.

A 1¼-cu.yd. shovel loads coal into 6-ton end-dump Ford and Chevrolet trucks. With the exception of one company-owned 5-ton auxiliary serv-



Left—Walking dragline with 5-yd. bucket and 110-ft. boom replaced original 3-yd. bucket, 85-ft. boom machine in August, 1937. A 7-yd., 140-ft. boom dragline is being erected to replace the 5-yd. machine. Right—The 26-in. seam is loaded into 6-ton trucks by a 1¼-yd. shovel.





Left—These 24x48-in. crushers, in tandem, control plant feed to meet varying size and seasonal demands. Right—A 60-ton-per-hour wash box cleans 3x0-in. coal.

ice truck, all trucks are hired on a tonnage basis. Six or eight haul an average of 3 to 4 miles round trip from pit to washer and make about twenty trips per day. Ramps laid with 14-ft. sections of double 3x12-in. oak are located at each end of the pit. Runways are gaged with cross ties. Trucks usually travel on the coal in the pit. Ramps and roads are surfaced with gravel and crushed limestone; extensive maintenance is necessary only during spring thaws.

Drainage ditches on the highwall and twelve Sterling sled-mounted 3-in. discharge gasoline-driven pumps keep the pit dry. The dragline and an R-7 Caterpillar diesel tractor with La-Plante-Choate bulldozer blade do all the ditching. The bulldozer also cleans coal surface and levels ground for dragline operation. An R-2 Caterpillar diesel tractor is on hand for moving pumps and grading roads.

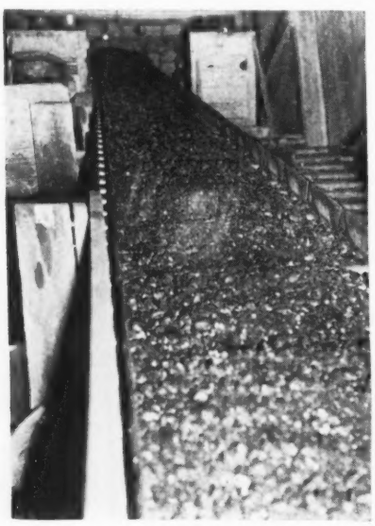
Two 24x48-in. crushers, in tandem, receive coal from a 20-ton 36-in. apron-conveyor-bottom hopper, into which the trucks dump except when lump is wanted. One crusher is a single-roll, adjustable 3 to 8 in., and is driven by a 50-hp. Westinghouse motor. It feeds either the second double-roll, adjustable 1¾ to 3-in. and operated by a 25-hp. General Electric motor, or bypasses into a 50-ton hopper with apron-conveyor bottom. When lump is desired, trucks dump directly into the 50-ton hopper. Normally the summer market demands small sizes, and both crushers are used. Winter demand is for the larger sizes, and the second crusher is bypassed.

Modern-minded management at Marriott-Reed has shown that truck mines can have high standards of efficiency and preparation. Output has increased from 200 to 600 tons per day in a three-year period. A 60-ton-per-hour washery for 3x0-in. coal has been added and product handling improved by shaker and dewatering screens, crushers and storage bins.

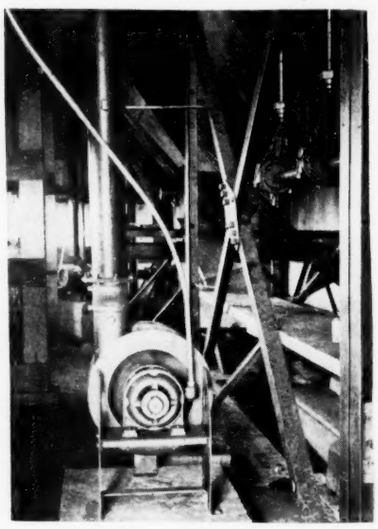
An 86-ft. 36-in. steel General Conveyor furnishes plant feed, emptying onto the main raw-coal double-deck round-hole shaker screens to make 8-in. lump, 8x3-in. egg, 3x1¼-in. stove and 1¼x0-in. screenings. Lump is stored in a 20-ton chute. To remove degradation, the 8x3-in. passes over a ¾x0-in. vibrator to a Link-Belt flight conveyor and three Holmes spiral chutes into three 50-ton bins. Undersize is held in another 50-ton bin.

An 80-ton bin with four loading gates receives the 3x1¼-in., which can be fed into the washer, truck-loaded or reduced to 1¼x0-in. by a McNally 24x48-in. double-roll crusher under the bin. The 1¼x0-in. from the shaker screens may be loaded into trucks from a 75-ton four-gate bin or fed into the washer. Two pickers on the run-of-mine conveyor and one on lump or egg clean raw coal.

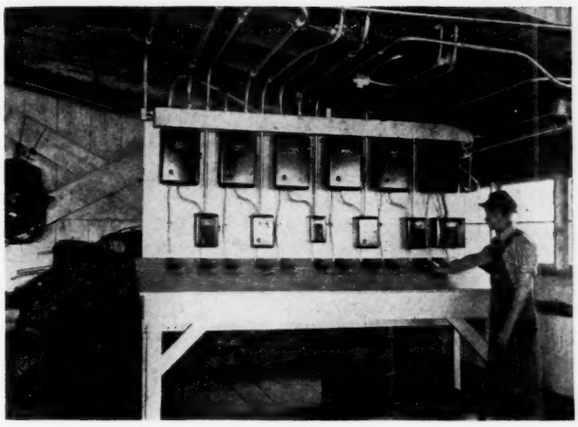
Fed by a bucket elevator from the raw-coal bins, a McNally-Norton 60-ton-per-hour single wash box cleans 3x0-in. coal. The box has both pri-



Raw coal is fed to the preparation plant by a steel conveyor 86 ft. long and 36-in. wide.



Underside of the washery showing wash box, settling tank and fresh-water sump.



Left—Washery control panel operates pumps, screens, elevators, wash-box valves, blower and raw-coal conveyor. Right—Straw filters clear sludge from water which is added to the 6,000,000-gal. fresh-water pond.

mary and secondary (middlings) refuse gates and conveyors. Each reject conveyor empties into a 15-ton bin and refuse is trucked away. Middlings may be dumped into the 20-ton raw-coal hopper and crushed before entering the plant. Wash box, settling tank and fresh-water sump are in tandem, with the box feeding directly into the settling tank and the tank overflow partly replenishing the sump fresh-water supply. The unit has a McNally motor-operated valve and water is recirculated by a 4-in. centrifugal pump. Settling-tank sludge is drained into a concrete pit once a week. A 3x4-in. centrifugal pump with 7½-hp. motor empties this pit into the washery sludge trough.

Three Sizes Are Washed

Triple-deck shaker screens take washed coal from the settling tank by a 50-ft. 24-in. dewatering bucket elevator and make 3x1¼-in. egg, 1¼x¾-in. nut and ¾-in.x0.5-mm. stoker washed sizes. Each size is stored in separate 60-ton bins, with 1¼x¾-in. in a double loading-gate bin. There are fresh-water sprays on each screen. The ¾-in. coal is dewatered by 0.5-mm. wedge wire.

Sludge is carried by an 8-in. trough to a pond with three sets of baled-straw filters held in place by 4-in. posts and fence wire to remove the sludge particles from the water. Clear water overflows to a 6,000,000-gal. fresh-water pond. Excessive sludge accumulations are removed by dragline. Fresh water is pumped from the pond to the washer by a Dayton-Dowd 1½-in. centrifugal driven by a 15-hp. motor.

Construction Is Modern

The washer is operated by a G. E. panel with switches and pushbutton control. All wiring is in conduit. Total connected horse-power is 200. The plant is frame on a concrete foundation; the washery, added to the raw-coal tipple, is McNally-Pittsburg design and construction. For heating purposes, fan-type hot-water radiator units will be supplied by a low-pressure boiler.

Ample Storage Provided

Large storage facilities are necessary to a truck mine to anticipate size demands. Marriott-Reed has ten storage bins with seventeen loading gates: fifteen are Link-Belt clamshell type; two—for loading 8x3-in. egg—are Holmes drop chutes. In addition, at least 1,000 tons each of nut and slack are stored on the ground and loaded into trucks by Fairfield 18-in. chain-drag conveyors. Other sizes also are stored in the open to meet unusual demands. A concrete slab was poured under the entire plant to provide good traction at the loading gates. To prevent washed coal from freezing, the washery is shut down early in the day and bins are emptied before closing time. Calcium chloride also is used when necessary. Empty and loaded trucks are weighed on a Howe scale with Weightograph attachment.

Left—New modern preparation plant and office as seen from U. S. Highway 40. Right—Modern office appliances are used; note ground-glass weight indicator attachment on 15-ton truck scale.

NEW LIGHT ON OLD QUESTIONS

Human Approach to Prevention of Accidents From Falls to Roof and Sides*

By J. E. JONES

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Benton, Illinois

At occasional mines, success has been attained in reducing the number of accidents from falls, and the basis of that success has been the fact that management assumes that all roof is treacherous and requires the miners to timber it according to a determined plan whether the roof be apparently good or bad. With this system a definite interlocking supervision ascertains (1) either that the required material for the support of the roof is at hand, or work in the place ceases; (2) that the place is timbered as the plan directs and (3) that the worker always has his safety post or posts properly set or is cleaning a place in which to set such a post. In addition, both worker and supervisor must sound roof, ribs and face to ascertain if additional timber is needed to that set forth in the plan, which must be set at once if the roof needs it.

Some managers stress closer supervision and some advocate education as a means of attaining greater safety. Advocates of closer supervision declare (1) that actual practice has proved it to be the safer plan, (2) that with it the worker, despite what some have said, does not develop a fatal reliance on others to point out defects in the roof and sides, (3) that close supervision brings men and management in closer contact with advantage to both, (4) that, with frequent contacts, the worker loses his disposition to question the right of supervision, and (5) that supervision provided for safety at the face serves to protect the worker not only from immediate dangers but from others at a distance.

Arguments in opposition to close supervision are (1) that supervisors cannot be very effective or the accident rates of such men per number of them employed would not be higher, as it has been proved to be, than that of every other group; (2) that close supervision makes robots of miners who are told to "do this" and "don't do that," and who eventually practically cease to be miners from lack of authority and responsibility in their working places; (3) that the miner becomes ignorant of danger and learns to rely on the knowledge and presence of the supervisers; (4) that he develops a spirit of opposition expressed by the frequent rebuke to the supervisor, "I was digging coal before you were born"; (5) that the miner feels quite frequently that increased supervision is not provided for greater safety but for faster production; (6) that supervision falls down whenever the supervisor is obliged to busy himself elsewhere and (7) where many details have to be watched, the supervisor will be more likely to miss one of these in his brief visit than a worker reminded by his constant observation of the objects in his room and held responsible for his actions and safe operation.

Arguments in favor of a dependence on the education of the worker as a means of increasing safety are: (1) that the democratic way of operating is to depend on, and aid, the intelligence of the worker; (2) that workmen are just as able to master the art of roof sounding and roof hazards as to pass on problems relating to mine gases, ventilation, pumping and electricity; (3) that education may take time but will be a permanent asset that will serve for all time and (4) that with education such a large number of individuals will be making a coordinated study that progress in its development will be inevitable.

Against these arguments are the following: (1) That many sources of education have been available to workers for the past generation, yet falls, injuries and fatalities are no less numerous than two or three generations ago; (2) that "experience is the best teacher" and that "you can't learn about loose rocks out of books"; (3) that workers have now vocational high school and academic education, but it does not appear that they recognize a bad piece of rock any more surely than their forefathers or at least guard themselves any better against it.

Probably both supervision and education and a form of educatory supervision will be necessary to get the best results. The repeated performance of the correct procedure is in itself an education, forming a habit from which the worker later will be unlikely to vary.

But one of the greatest of troubles with regard to falls is the habit of "allowing that which is not wholly approved." The roof may be known to be not altogether sound, but hope exists that it will be good enough until some work believed to be urgent has been completed. This "tolerance" is the cause of most of the trouble, and it is because, in a mine that has a good top, men are tolerant of questionable roof that such mines often have more falls accidents than a mine where the top is known to be bad and no chances are taken. Supporting the roof becomes a habit in such a mine, whereas in the mine with good roof, doubtful top may make necessary an unexpected interference with normal procedure—the breaking of a habit rather than its fulfillment.

Causes for tolerance of an approved roof are: (1) that the workman will be in the place only a short time, (2) that the man following him can correct the faulty condition, (3) that the workman promises himself that he will not go near the point of danger, (4) that the timbering will require much work, (5) that material is not readily available, (6) that the workman is in a hurry, (7) that the roof is not so bad and that it will give further warning before it falls, (8) that to delay work to protect the roof will interfere with the operations of others, (9) that the place is about to be finished, so why waste time and timber on it? and (10) that the workman is anxious to complete the loading of a car.

But bosses also have tolerance of doubtful roof (1) because of anxiety to have loaders enter a place that needs timbering but cannot be timbered because the timberman is busy elsewhere, though he is expected to arrive soon; (2) because of shortage of coal, so that development is pushed and propping temporarily neglected; (3) because discipline is not enforced, (4) because of such an inordinate desire for tonnage that the boss does not want to lay off anyone for violation of rules, (5) because experience has shown that an uncorrected hazard does not always result in a casualty, (6) because a lack of timber causes a chance to be taken if only for a short time.

An intelligent study of roof will create an interest in coping with its dangers and a pride in having a working place free from roof and side hazards. The problem of roof testing has not been approached with a scientific attention comparable to the gravity of the danger, as proved by the large percentage of fatalities arising from roof, side and coal-face falls. Recent sound and vibratory discoveries have not been harnessed to the sounding problem. Unquestionably, there is much room for a development of our present technique.

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Selection of Motors and Controls

Two booklets reprinted from *Power* entitled "How to Select D.C. Motors and Control," GED 856, and "How to Select A.C. Motors and Control," GED 847, have just been issued by the General Electric Co., at Schenectady, N. Y., for distribution. These

* Last of three articles on roof sounding. First article appeared September, p. 62, and second, October, p. 166.

give in plain language the fundamentals covered by these two subjects, explaining the several types of motors, how they operate, how to select the kind of motors needed for the job, how speed is controlled and how, with direct current, brushes are set; how to inspect and maintain motors, a diagnosis of their troubles and the way to prescribe for them, and something also on insulation resistance. Electricians will find this brief summary most helpful in their day-by-day duties.

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From These Graphs of Mine Circuits, Foremen Readily Can Check Big Power Losses

If a mine foreman will recall that his substations are rated to convert only 100 kw., 200 kw., or 300 kw., it will be easier for him to realize what severe losses of power are involved where 50 or 100 kw. is consumed in electrical resistance. The loss involves the expenditure of real money for power, but usually the big money loss is not so much in power cost as in slowed production and higher maintenance, both due to the accompanying drop in voltage.

As an aid to simplified determinations of kilowatt-hour losses in copper and rail circuits, F. L. Stone, engineer of the mining section of the General Electric Co., presents the graph Fig. 1. Its use is best explained by assuming a typical case of a deficient circuit as indicated in the upper of the two drawings, Fig. 2.

Assume that in a mine the center where the main current is distributed in branches to several loads is located 3,000 ft. from the substation by which it is served, and that the electromotive force at the substation is rated at 300 volts but is actually 275, and the peak load is 1,000 amp. A No. 6/0 trolley wire carries the outgoing current, which returns through the two 40-lb. rails of the mine track, both of which are bonded.

To determine from the graph Fig. 1, the loss in kilowatts, locate the point *1* where the 1,000-amp. vertical line intersects the curve of resistance for 6/0 wire. On the scale to the left, the loss can be read as 32 kw. But this is per 1,000 ft.

Following the same 1,000-amp. line on up to the curve of resistance for 40-lb. track, the equivalent loss as noted on the vertical to the left will be 13½ kw. for 1,000 ft. of track. Summing the kilowatt losses in trolley wire and track, we have 45½ kw. for each 1,000 ft., or 136½ kw. as total loss in the combined trolley-wire and rail circuit from substation to load center. This loss is 45.5 per cent of the substation capacity of 300 kw. However, the loss expressed in kilowatts is not dependant on the voltage; it would be the same if the electromotive force at the substation were 550 instead of 275 volts.

Now, turn to the situation as depicted in the lower drawing of Fig. 2. Here, conditions are the same, except that a conductor is provided with a cross-section of 1,500,000 circ.mil, and the rail size is increased to 60 lb. To find the loss when using this more adequate circuit, locate the point *3* where the 1,000-amp. vertical intersects the curve of resistance of the 1,500,000-circ.mil curve. On the scale to the left, the loss in the positive leg of the circuit is found to be 7 kw.

Next, locating point *4* on the intersection of the resistance curve for 60-lb. track with the same vertical line, a loss of 8½ kw. is determined. Adding this to the loss in the trolley line, the total is 15½ and, multiplying by three for a total distance of 3,000 ft., the loss will be 46½ kw. The loss in the entire circuit, therefore, is 15.5 per cent of the substation capacity.

The loss of 45.5 per cent at peak demand in the entire circuit as pictured at the top of Fig. 2, of course, could not be tolerated. With it the equipment would run slow, maintenance costs would be high and power would be needlessly wasted. On the other hand, the loss of 15.5 per cent during peak load sustained in the second circuit is close to a reasonable figure. Load factor, length of time the section is going to be working, and power cost per kilowatt-hour are among the other conditions which would have to be considered to determine if it would pay to increase the size of the copper conductor above the 1,500,000-circ.mil size assumed.

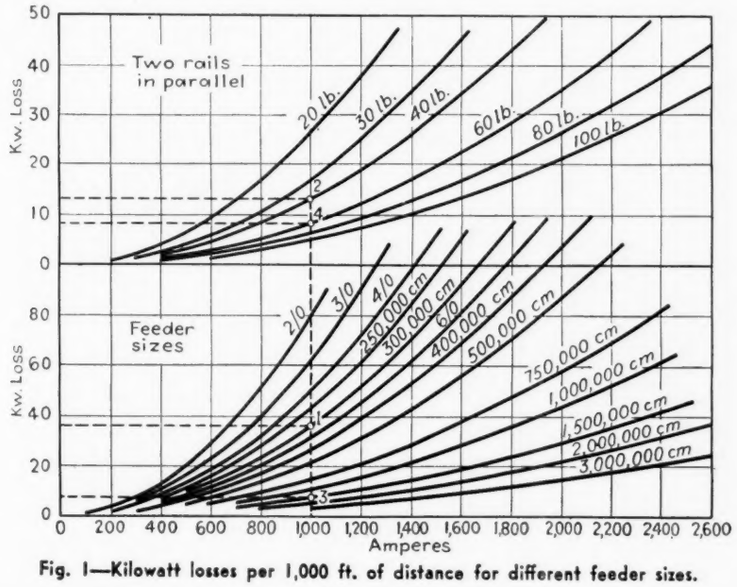

Fig. 1—Kilowatt losses per 1,000 ft. of distance for different feeder sizes.

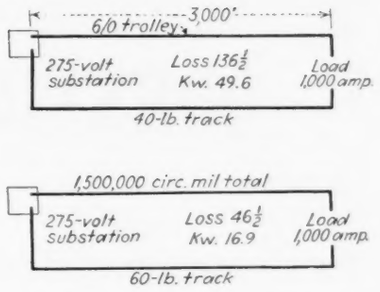

Fig. 2—Losses in these circuits are determined from the graphs in Fig. 1.

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Stinkdamp Not Dangerous In Coal Workings

Hydrogen sulphide—stinkdamp—rarely if ever occurs in coal mines in sufficient quantity to be harmful. It gives no odor when in concentrations of 0.000,002,2 per cent by volume, but is detectable where the concentration rises to 0.000,013 per cent, and the odor is faint where the volumetric percentage is 0.000,077. All this is well below 0.005 to 0.010 per cent, a concentration which with prolonged exposure will cause conjunctivitis (gas eyes), or 0.06 to 0.10 per cent, which may cause immediate cessation of breathing followed by death if the person is not rescued and resuscitated immediately.

Significant sites of attack are moist tissues such as the conjunctiva (the mucous membrane which lines the inner surface of the eyelids and turns back over the front part of the eyeball) and also the lining of the respiratory tract. With 0.02 to 0.03 per cent of the gas, conjunctivitis and respiratory irritation will be marked after an hour's exposure. With 0.07 to 0.10 per cent, rapid unconsciousness, cessation of respiration and death occurs, but with 0.1 to 0.2 per cent these effects supervene in a few minutes.

However, in testing devices for respiratory protection, the U. S. Bureau of Mines frequently conducts experiments in which men expose the entire surface of their bodies for 30 minutes to a mixture with air of 2 per cent of hydrogen sulphide without symptoms of poisoning, discomfort or discoloration of the skin, though the pure gas is said to cause in 60 minutes a reddening of the skin (erythema), spots like flea bites and red mottles. Evidently, the skin does not absorb the gas as readily as the conjunctiva or respiratory tract.

These facts are based largely on an article delivered before the American Public Health Association by W. P. Yant, now director of research and development, Mine Safety Appliances Co.*

* *American Journal of Public Health*, Vol. XX, No. 6.

QUESTIONS ASKED BY STATE BOARDS

First Grade Mine Foremen's Examination Pennsylvania, April 3, 1939 (Continued)

THE FOLLOWING are questions presented at the Pennsylvania first-grade mine foremen's examination, with the answers prepared by the committee propounding the questions. The percentage for a correct reply follows each answer.

Ventilation

Q.—(a) If you found an entry driven 100 ft. beyond the last crosscut and the place rising on an average of 4 per cent and explosive gas tailing out at the crosscut, what would be the depth of gas at the face of the entry?

(b) If the place is 10 ft. wide, how many cubic feet of firedamp is in the heading?

(c) If the firedamp mixture is at its most violent explosive point, how many cubic feet of methane is in the mixture?

A.—(a) 1 per cent grade equals a raise of 1 ft. for each 100 ft. horizontally; 4 per cent grade equals 4x1 or 4 ft. of gas at the face. (2 per cent.)

(b) $\frac{100 \times 10 \times 4}{2} = 2{,}000$ cu.ft. firedamp (2 per cent.)

(c) $0.10 \times 2{,}000 = 200$ cu.ft. of methane (1 per cent.)

Q.—(a) Ventilate sketch below (Fig. 1) of a portion of a mine, using two splits of air, one split for 1st and 2d butt, the other for 3d butt and main headings. Insert additional airways where it is necessary for proper and efficient ventilation.

(b) List all violations of law you find on attached map.

(c) Assuming 45 cu.ft. of methane is given off per minute in 1st and 2d butt split and total air measurement on return heading is 15,000 cu.ft., what is the percentage of gas in the mixture? Does the law permit operation of an open-type locomotive on this heading?

A.—(a) See sketch, Fig. 2. (8 per cent.)

(b)—(1) Crosscuts in alternate rooms exceed legal distance; (2) in 2d butt heading, three rooms driven beyond the last crosscut; (3) 2d butt and 3d butt aircourse driven beyond the legal distance of the last open crosscut; (4) crosscuts between the two right-hand headings of the main flat exceed legal distance. (3 per cent.)

(c) 45/15,000=0.003 or 3/10 of 1 per cent methane.

Electric haulage by locomotive operated from a trolley wire is not permissible in any gaseous portion of a mine, a gaseous portion of a mine as used herein being all the workings and roadways traversed by the locomotive and ventilated by the same continuous air current and in which portion explosive gas has been generated in sufficient quantity to be detected by an approved safety lamp within a period of two years, except when the portion in which the locomotive operates is free of accumulated explosive gas, and the highest methane content of the air current in which the locomotive operates is not in excess of 0.5 per cent, and except where the air current is so guided and directed that the opening or closing of a door will not interrupt or seriously diminish air flow passing into and through portion of mine in which locomotive operates. (4 per cent.)

Q.—In a split of air in a section of a mine, methane was issuing from the various faces at the rate of 6 cu.ft. per second. Airway of this section had following measurements: 7 ft. high, 10 ft. wide, 5,470 ft. long. The total quantity of air and gas in this split is 20,000 cu.ft. per minute.

(a) How many men are allowed to work on this split of air without the consent of the State mine inspector?

(b) What is the total number of men you would be allowed to work on this split of air with the consent of the State mine inspector?

A.—(a) 6x60=360 cu.ft. 360/20,000=0.018 or 1.8 per cent gas.

Therefore, no men would be allowed to work on this split of air without the consent of the State mine inspector. (4 per cent.)

(b) None. (2 per cent.)

Q.—A mine fan designed to deliver 200,000 cu.ft. of air, running at a speed of 180 r.p.m. and developing 3 in. water gage is delivering only 130,000 cu.ft.

(a) State reason why quantity of air is lower than specified for fan, and what steps are required to increase the quantity.

(b) State what benefits, if any, can be realized from the improvements.

A.—(a) Insufficient cross-sectional area due to insufficient or congested airways, creating high velocities, which in turn develop a mine resistance too high to permit passage of the 200,000 cu.ft. of air at the designated water gage of 3 in. In other words, due to insufficient area of airways, friction caused by high velocity of the 130,000 cu.ft. of air against congested walls of airways creates a mine resistance per square foot of rubbing surface equal to a ventilating pressure of 15.6 lb. per square foot or the 3-in. water gage.

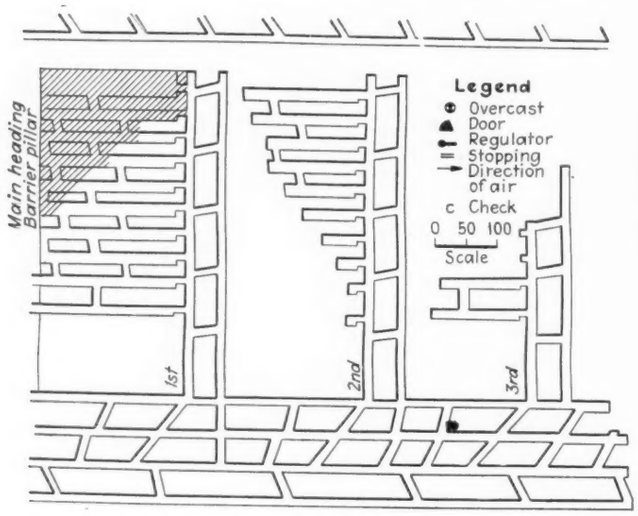

Fig. 1

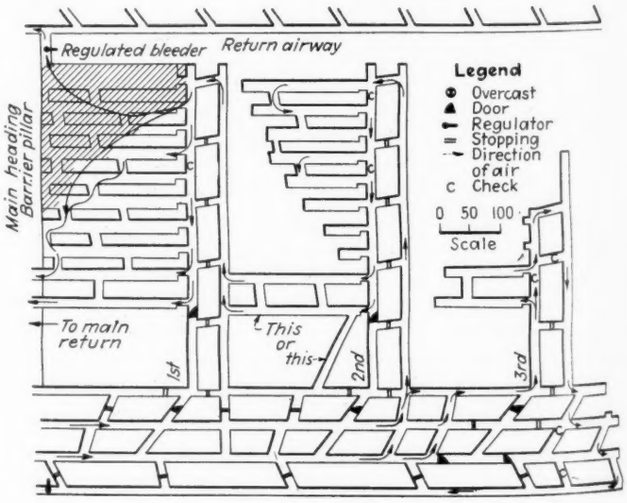

Fig. 2

(b) An increased quantity of air made available to distribute throughout the mine workings, without any noticeable increase in power cost, or the same amount of 130,000 cu.ft. of air at a decided reduction in power cost. (3 per cent.)

Improvements required to pass amount of air to meet specifications of fan are:

First, decrease resistance caused by high velocities of air current by increasing area through which air passes, either by additional airways or enlarging of existing airways.

Second, eliminate to practical limits sharp angles and uneven and rough airways.

Third, split the air within practical limits and in compliance with the law. (6 per cent.)

Safety Lamps

Q.—(a) In mines in which approved electric cap lamps are used, what classes of employees are required to use approved safety lamps?

(b) What persons may be intrusted with an approved safety lamp?

(c) What are the legal requirements regarding the construction of approved safety lamps?

A.—(a) Mine foreman, assistant foremen, firebosses, machine runners, shotfirers, pumpers, drillers, and at the face of all places other than room-and-pillar system where crosscuts are spaced more than 105 ft. apart. (2 per cent.)

(b) No approved safety lamp shall be intrusted to any person for use in a mine until said person has given satisfactory evidence to the mine foreman that he understands proper use thereof and danger of tampering with same. (2 per cent.)

(c) Whenever safety lamps are used in a mine by firebosses or other persons, they shall be so constructed that they may be safely carried against the air current ordinarily prevailing in that portion of the mine in which the lamps are being used. (2 per cent.)

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Chief Mine Electricians' Examination
Pennsylvania, 1939 (Continued)

SOME of the questions presented at the chief mine electricians' examination in Pennsylvania in 1939, with the answers prepared by the committee which wrote the questions, are here presented, with the percentage marking for the examinee's correct replies to the same.

Resuscitation

Q.—Describe how you would render first-aid to a person suffering from electric shock.

A.—A person suffering from electric shock should be treated as follows: After he has been released from the wire, turn him over on his face. Remove all foreign bodies from his mouth. Pull and keep his tongue forward. Turn his head to one side, resting it on his forearm, so that his mouth and nose are not in contact with the ground. Extend his other arm forward. Loosen the clothing about his neck. Start immediately the Schaeffer method of artificial respiration, continuing this method until the patient recovers or is pronounced beyond recovery by a physician. Heat-giving articles placed about the body are beneficial to the recovery of the patient. (2 per cent.)

Q.—Where should directions as to the restoration of persons suffering from electric shock be posted in the mine, and who shall be familiar with and know how to carry out these instructions?

A.—In every generating, transforming and motor room. All employees working in connection with electrical apparatus shall be so informed. (1 per cent.)

Machine Cleaning

Q.—(a) What electric equipment in the dry areas and in the gassy areas of conveyor sections must have the coal dust removed from them and how frequently?

(b) What electrical equipment, specifying each piece, in the dry and in the gassy areas of conveyor sections are required to be examined and how frequently?

(c) What procedure would you follow in making the examination of such electrical equipment?

(4) By whom should the report of such electrical equipment be made and what should it contain and how long should it be preserved?

A.—(a) All electric motors and cables shall be freed of coal dust once each operating shift. (1 per cent.)

(b) All electric motors and their controls and cables shall be examined once each calendar day. (1 per cent.)

(c) Examine all electrical equipment, including all connections, flange joints, and stuffing boxes, and see that seals are intact and also that equipment is clean. (1 per cent.)

(d) By the person making the examination. A written report of the condition of the equipment examined, designating by number or otherwise such equipment. Report to be preserved for one year. (1 per cent.)

Q.—(a) How often should explosion-proof motors used underground be opened, thoroughly inspected and cleaned, and by whom?

(b) How often should explosion-proof switches be opened and inspected?

A.—(a) At least once a week by the person in charge of electrical equipment or his assistant. (1 per cent.)

(b) At least once a month. (1 per cent.)

Q.—What safety is secured by keeping electric machinery free from excess oil and other lubricants and generally clean?

A.—The dangers of gas and dust ignition, fire, and the liberation of noxious gases are minimized. (1 per cent.)

Trolley Wires

Q.—How should bare power wires that are less than 6½ ft. above top of rail be protected where workmen are required by necessity to pass beneath them?

A.—By placing boards along the wire, which boards shall not be more than 5 in. apart nor less than 2 in. below the lowest point of the wire: Provided, that on curves the distance between boards may exceed 5 in., but shall not exceed 8 in. Other approved devices or methods furnishing equal or better protection may be used. (2 per cent.)

Q.—Where power wires and electric incandescent lamps are connected to the trolley circuit, how should such wire be joined to that circuit?

A.—The lug of the trolley hanger to which connection is made shall be drilled to receive the lighting wire and provided with a setscrew for securing same in place. (2 per cent.)

Track Maintenance

Q.—Why is it important to have the direct-current-return rails properly and effectively bonded?

A.—To minimize the dangers from arcing, sparking, and stray currents, and to increase the efficiency of the electrical system, all of which favorably influences safety and economy. (2 per cent.)

Insulated Joints

Q.—When a joint is made in an insulated electrical conductor, to what extent should the joint be reinsulated?

A.—To at least the same extent as the remainder of the insulated wire. (1 per cent.)

Q.—(a) How would you splice a mining-machine cable to make it mechanically and electrically efficient?

(b) What dangers may be introduced by poorly made splices in cables?

A.—(a) Remove sufficient insulation to permit adequate contact of the strands to be joined. Thoroughly clean each strand, and clamp or pigtail the strands as tightly as possible, and effectively reinsulate the joint. (1½ per cent.)

(b) If a splice fails there is a definite fire and gas-ignition hazard due to the formation of an arc or flash, and it also is possible that the cable may be destroyed through burning; also, the gases formed when an insulated cable "blows" are decidedly dangerous and occur in heavy volume. (1½ per cent.)

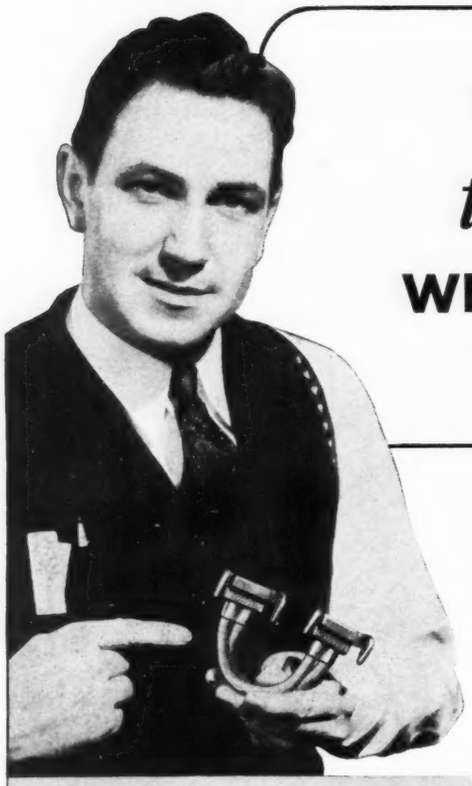
Miscellaneous

Q.—Where live parts in underground substations are exposed either on front or back of switchboards what clearance is required?

A.—Not less than 3 ft. (1 per cent.)

Q.—What are the dangers incident to the use of electricity in gassy and dusty bituminous-coal mines?

A.—Explosions caused by ignition of gas and coal dust, by mine fires, burns, shocks and electrocutions, and by noxious gases liberated when insulating material is decomposed by heat. (4 per cent.)



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MINING engineers tell us it's the safest bond to use, that it offers the best protection against derailed cars. And when you look at this bond, it's not hard to see why.

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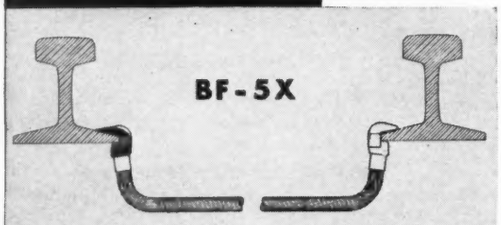
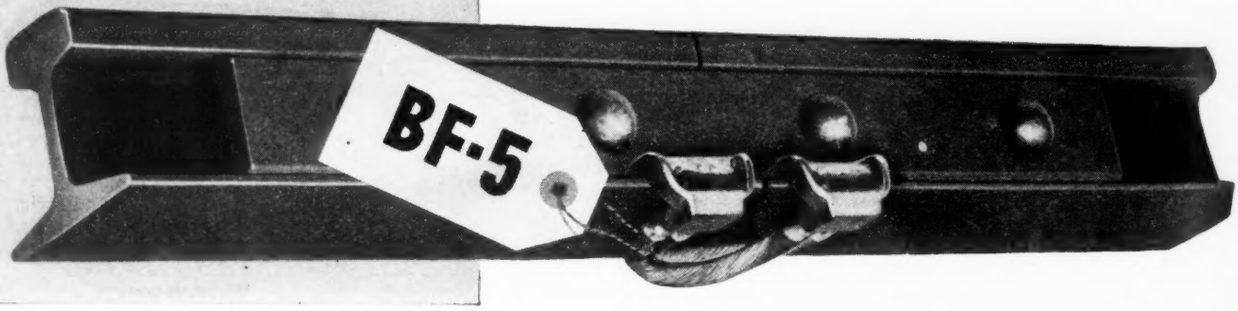
Besides its terminal features, the BF-5 is of typical Tigerweld construction, with copper conductors firmly joined to the solid steel terminal by our special flash butt-welding process. It is a bond designed and built for easy installation and long, trouble-free service.



CROSS BOND HAS IDENTICAL TERMINALS

To simplify and speed up the welder's job in installing cross bonds, the Tigerweld BF-5X Cross Bond is equipped with terminals identical with those of the BF-5. Ask any welder and he'll tell you this is an important advantage, requires no change in his technique, and helps produce stronger, more solid bonding. No other power bond offers you this feature—identical terminals on both joint and cross bonds.



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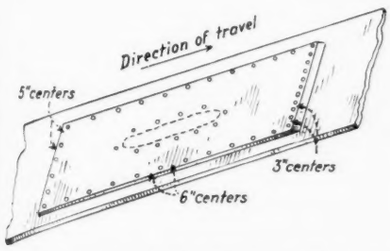
UNITED STATES STEEL

WHAT'S NEW IN OPERATING IDEAS

Flat-Headed Bolts Patch Conveyor Belts

Cutting out bad pieces of conveyor belts and splicing in new sections has been discontinued at the mine of the J. H. Somers Coal Co., Adena, Ohio, writes John Gross, electrician. Instead a piece of belt of the proper length and width is placed directly over the hole or bad place. Holes are punched and $\frac{3}{8}$x1$\frac{1}{2}$-in. flat-headed elevator bolts are used to fasten the repair section in place.

Holes are punched on 3-in. centers at the leading end of the patch section, on 5-in. centers at the following end, and on 6-in. centers along the sides. Washers are used on the bottoms of the bolts and the leading edge of the patch is beveled off so that the section will go over the idlers easier. After



Showing how belt patch is applied.

the bolts are tightened they are cut off flush with the nuts. If the belt is badly torn, a few bolts are put in around the bad spot.

With this method, a little care and time will result in a good job, Mr. Gross states. The belts in use are $\frac{3}{8}$ in. thick and 46 in. wide. Some patches as long as 18 ft. have been made, as well as several short ones. All have "given satisfactory service for some time."

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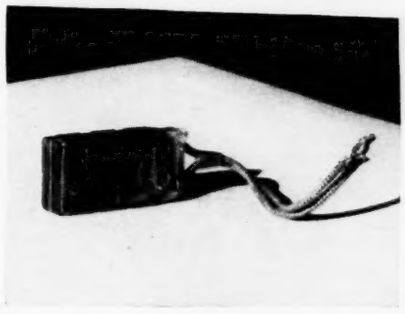
Checking Neutral on Generators Facilitated by Split Brush

The job of checking the neutral point of generators is made definite and easy by use of the split brush shown in the accompanying illustration, reports Fred W. Richart, *Coal Age's* special contributor at Carterville, Ill. The device, designed by Ralph R. Richart, then electrical engineer for the Union Colliery Co., Dowell, Ill., consists of two pieces of brush carbon. These are insulated from each other with mica and are bound together with three belts of eight to ten layers of $\frac{3}{4}$-in. Scotch tape to bring the assembly up to standard dimensions. Pigtails are attached to each half for voltmeter connections.



This device eases the problem of checking generator neutral.

"Substituting this device for one brush and then rocking the brush assembly back and forth on the commutator, the exact neutral point readily is found. The brushes must be checked for equal spacing around the commutator."

•

Valve-Seat Removal Facilitated By Special Screw Puller

The screw-type puller shown in the accompanying illustration is offered by E. C. Hitchcock, electrician, New River Co., Summerlee, W. Va., as an aid to removing valve seats from certain types of pumps where the seats are without threads. This tool, says Mr. Hitchcock, should be in every mechanic's or pumper's tool bag for use when it is necessary to remove a seat for replacement or repair. In operation, the two hooks are dropped through the openings in the seat and turned until they are in proper position. Then screwing up the nut on the puller bolt draws the seat out of its chamber.

•

Proper Spiking of Rails to Ties Keeps Track in Better Shape

Where wood ties are used, there is a right way and a wrong way of spiking, and W. H. Luxton, Linton, Ind., observes that not everybody knows the correct method. Therefore, he offers the diagrams reproduced in

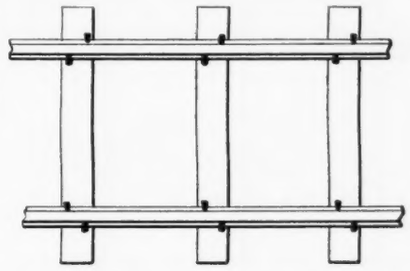
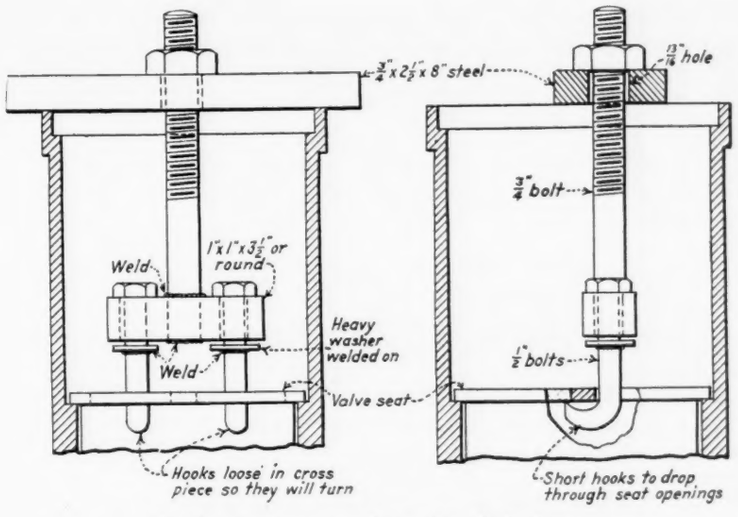


Fig. 1—Right way to spike rails, with inside spikes on one side of the tie and outside spikes on the other.

Figs. 1 and 2. The correct spiking method is shown in Fig. 1, with the inside spikes on one side of the tie and the outside spikes on the other. Spiking in this fashion reduces the chances of splitting the tie, and further, in case of a derailment, the ties are less



Details of valve-seat puller and method of use.

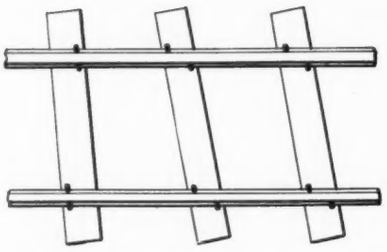


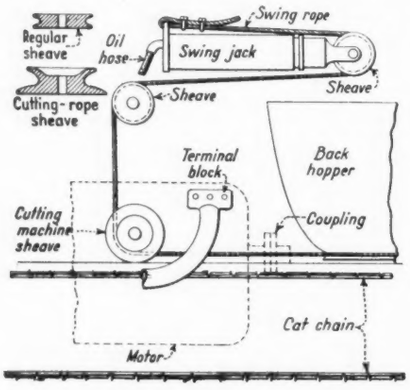
Fig. 2—Wrong way to spike track, showing how ties are likely to slew around in case of a derailment.

likely to be slewed around as shown diagrammatically in Fig. 2, reducing the gage and increasing the difficulty of restoring the track to good condition.

•

Jumping of Swing-Jack Rope Prevented by New Sheave

Offering the accompanying sketch showing diagrammatically the arrangement of sheaves and swing-jack rope on the side opposite the operator on a Joy 5BU loading machine, Thomas James, mine foreman, American No. 2 mine, Knox Consolidated Coal Corporation, Bicknell, Ind., points out that almost everybody working with this type of loading machine has had trouble at one time



Showing installation of new lower sheave to prevent jack rope from jumping off on the outside.

or another from the rope jumping off the lower sheave. This results when the sheave gets out of alignment or when the control valve does not function properly, permitting slack in the jack rope.

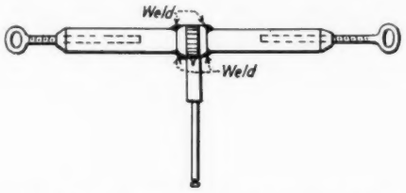
When the rope jumps off on the outside of the sheave, which is practically every time, the cable entrance and terminal-block housing, containing the wiring for the motor, is torn loose. Sometimes, the wiring is torn loose at the motor. This means a delay of at least an hour and sometimes the rest of the shift. If the rope on the operator's side jumps off, all the oil connections may be wrecked.

The difficulty easily is remedied by installing a different type of lower sheave, says Mr. James. He suggests the front sheave from a Goodman 50 cutting machine, which has a large rim on one side. This rim, when the sheave is installed, comes down to the caterpillar fender and thus makes the possibility of the rope jumping off on the outside almost nil. If it jumps off on the inside, it is stopped by the pin without any damage and can be replaced in a jiffy. When the sheave is installed, the large rim naturally is put on the outside. The method is first to put the rope on the sheave and then slip the sheave on the pin.

•

Ratchet Turnbuckle Fabricated With Old Track Ratchet

A ratchet-type turnbuckle is easily made by cutting a regular turnbuckle in two in the center and welding the two parts to an old track ratchet at four points, writes E. P. McFarland, electrician, Virginia Jellico Coal



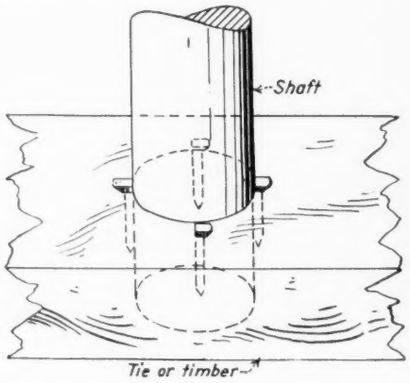
Showing construction of ratchet turnbuckle.

Co., Clairfield, Tenn. The finished tool is shown in the accompanying sketch. "We find it a great time saver in hanging trolley wire or feeder lines. When splices or switches are installed, reverse the ratchet and release. We have stretched 1,700 ft. of 500,000-circ.mil cable at one time with this ratchet," concludes Mr. McFarland.

•

Track Spikes Driven Around Shaft Hold Rope Rollers in Place

A common method of installing rope rollers or sheaves where the shafts are vertical, writes Charles W. Watkins, Kingston, Pa., is to bore or mortise a hole in a timber or tie small enough for a drive fit. To pinch the shaft and hold it more solidly in place, track spikes may be driven around it. The proper way to drive these spikes—with the point across the grain of the wood to reduce the possibility of splitting—is shown in the accompanying sketch. In addition, the spike heads serve as bearings for the sheave hub. And the shaft itself bears on the spikes, another safeguard against splitting of the wood.



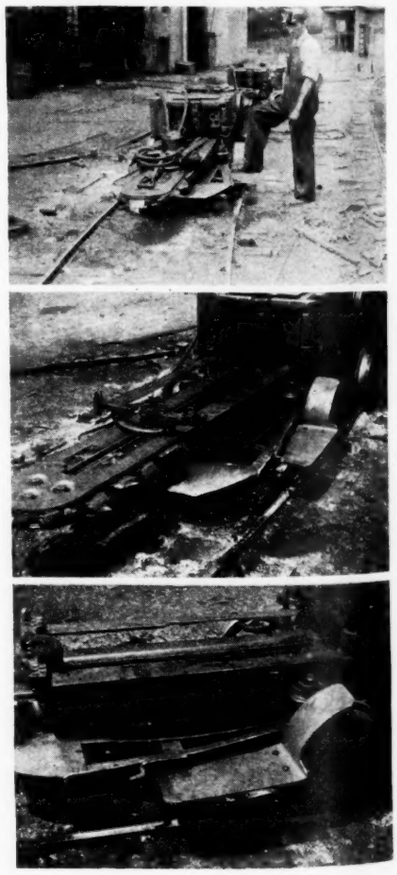
How track spikes should be placed to hold shaft more firmly in place.

Socks

"A sock on the foot is worth two in the teeth" is the way someone has paraphrased the old "bird in the hand" motto. Perhaps there might be a moral in the paraphrase if the sock on the foot were viewed as a precaution against two or more in the crockery, whether grown by oneself or bought over the counter. So maybe the idea is to keep the socks on and thus be prepared. Helping keep the operating, electrical, mechanical and safety men around the mines prepared is the business of this department. But you can assist by sending in your kink for saving money, raising efficiency or promoting safety. Do it now and don't forget a sketch or photo if it will help to make it clearer. For each acceptable idea Coal Age will pay $5 or more on publication.

Safety Stirrups on Shortwalls Reduce Chance of Injuries

To reduce the possibility of injuries, Ballard Taylor, shop foreman, South East Coal Co., Seco, Ky., has designed the safety stirrup shown in the accompanying illustrations for installation on Goodman 12AA shortwall cutting machines. In addition to its other features, the stirrup makes it difficult for a man to step on the rail in front of the truck wheels.



Showing safety stirrip installed on shortwall truck.

MATERIALS
METHODS
FACILITIES
EXPERIENCE
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Five Vital Points—

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Jig for Shaping Brushes Aids Maintenance

"Jig-fitted brushes carefully compounded from the proper admixture of carbon and graphite, plus a commutator kept true by occasional dressing, make for peace of mind on the part of the maintenance electrician," declares P. C. Ziemke, Milwaukee, Wis. "A jig built for each type of motor or generator commutator, or at least the important units, will insure having well-fitting brushes available.

"The first step is to measure the diameter of the commutator with a caliper or by passing a steel tape around it. In the latter instance, divide the value by 3.1416 to arrive at the proper dimension. Next procure a piece of wood, say 1 ft. long by 1 ft. wide and 2 in. thick. Lay this on the bench and mark out the required size of circle with a divider or a string, nail and pencil. Cut this out on a band saw and mount it in a lathe for final truing. Then fasten a spare brush holder in the tool post with an old brush in position. When curvature of the old brush coincides with the curvature of the jig's periphery the setting is correct. Then coat the jig with a strip of emery cloth or garnet paper and start the lathe. Pressure on the new brushes to be shaped may be applied by hand or by the brush-holder springs until the correct arc is ground in, which operation requires only a moment.

"By this simple means a full set of new brushes may quickly be shaped up for speedy fittings to the commutator during shutdown periods with the certainty that every brush will have 100 per cent contact area with the commutator and thus render sparkless operation under peak loads."

•

Key Men Lunch Together To Discuss Problems

Each day at lunch time the key men gather for an informal discussion at Pyramid Nos. 1 and 3 mines, Pyramid Coal Corporation, Pinckneyville, Ill. Seated on the left side of the table are Otis Bledsoe, chief engineer; Paul Moran, preparation manager; H. P. Fay, master mechanic; J. J. Dennis, chief chemist; and W. R. Kelly, shop foreman at far end of table. At the right side are Arthur Lee, mining engineer; H. Place, assistant top foreman; I. H. Pulley, chief clerk; C. E. Davis, billing clerk; W. L. W. Roe, billing clerk, and General Superintendent C. W. Woosley. Problems of the day are discussed and each man is enabled to coordinate his work better with that of others, thus making for efficiency.

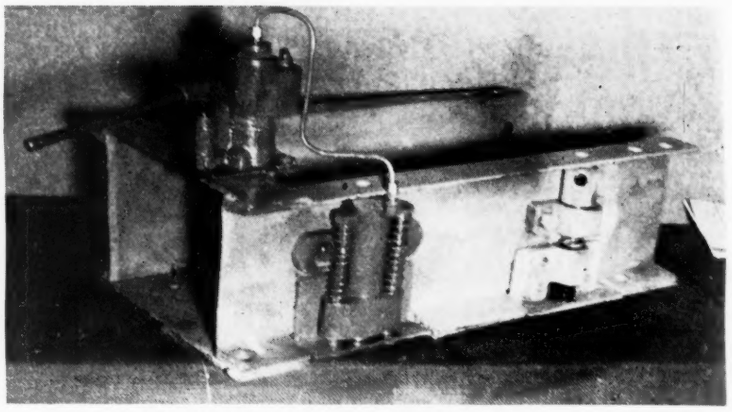
Efficient operation is fostered by the daily key-men's lunch conference.

•

Hydraulic Tilter on Cutter Proves Safer and Better

Much safer operation, fewer delays, better face preparation and greater earnings for the machine men are among the results of adding hydraulic leveling jacks to the Type 12AA universal shortwall undercutters used in the Amigo (W. Va.) mine of the Amigo Coal Co. This improvement, by Hubert Bowyer, is illustrated in the accompanying picture, made at the Bluefield Industrial Exhibit, where the idea won for Mr. Bowyer the $15 second prize in the miners' gadget contest.

For illustrative purposes the old screw jack and the new hydraulic jack are shown mounted on the same channel. On the actual installations the screw jack is taken off and the other put in its place. The pump was taken from a motor-truck jack. Cylinder and piston of the jack proper were made in the mine shop. As the shoe is forced down to tilt the cutter bar the two coil springs are compressed. Thus, they are in condition to pull the shoe back up flush with the bottom of the underframe out of the way during handling of the machine between truck and face. The pump, with removable handle, is mounted near the machine controls. Decreasing the tilt is accomplished by opening a small valve on the base of the pump.



New and old tilting jacks contrasted.

Mr. Bowyer explains that in the mine where these hydraulic jacks have been added to the cutters the coal is "burnt" to the bottom slate and cannot be dug up with a pick. According to the labor contract, if a machine crew cut a thick bottom they must go back and cut it out or pay the loader for scrapping, which usually requires some explosive as well as the extra labor. For that reason the machine crews gladly paid the shop men to install the jacks on their machines.

The hydraulic jack is safer, Mr. Bowyer contends, because to adjust the old screw jack the operator had to go to the right-hand rear of the machine, where danger of slate falls is greater than ahead of the cutting. And usually he stopped the machine while making the adjustment. Now, without stopping, he does the tilting from his safer position at or near the controls. The hydraulic jack can be applied to any type of cutter formerly equipped with a screw-type tilting jack.

•

Close Attention to Field Coils Saves Series Armatures

"Few maintenance programs take into account the destructive effect of defective internal field-coil insulation on motor operation: i.e., short armature life, rapid brush wear, excessive sparking, rapid deterioration of ground insulation on good field coils, pitting of commutator, etc.," declares A. C. Roe, engineering division, Westinghouse Electric & Mfg. Co., in discussing maintenance of main and commutating field coils in series-type motors.

He advocates close attention to the following five rules: "(1) When refielding never mix old or repaired field coils with new coils in any one frame; (2) use either all new field coils or all rebuilt coils in the one frame; (3) don't put one or more new field coils in with old coils for quick temporary repairs; use rebuilt coils; (4) be certain that the polarity of all coils is correct, as wrong polarity will soon burn out a good armature; (5) for rewound armatures, use only a frame that has good field coils.

"This practice," he continues, "is based on the fundamental principle of the series

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I sure need some replacements badly!"

When your hard-working Coal Tipple hollers "HELP!"

Judging from the unusual number of inquiries and orders received at the Morrow plant during the past few months, we know pretty well what a high pressure production ordeal your present tipples must be experiencing.

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Morrow's background of 25 years of specialization in the design and construction of hundreds of tipples can be of real value *now*. Why not call in a Morrow engineer for discussion? No obligation, of course.

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- ROTARY DUMPS
- CHUTES
- LOADING BOOMS
- CRUSHERS
- DRYERS

and the

- MORROW-PRINS MULTI-FLOW COAL WASHER

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DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

CINCINNATI CUTTER CHAINS

In both Duplex and Standard types, the new CINCINNATI CUTTER CHAIN is designed to handle the toughest cutting conditions. Reliability . . . economy . . . operating efficiency—every feature that has always been built into Cincinnati Chains has been enlisted in this new, cost-lowering unit. Of special interest is the new joint construction. It's designed to take the brunt of the wearing action . . . thus, joint-wear in both block and connector is eliminated. Add to this the fact that the joints are easy and inexpensive to renew, and you'll easily see why Cincinnati Cutter Chains are admirably suited to lower your coal cutting costs. For, when the joint is replaced, THE PITCH OF THE CHAIN IS THE SAME AS IT WAS ORIGINALLY. So, don't surrender to high coal cutting costs . . . choose the NEW CINCINNATI CUTTER CHAINS as the spearhead of your attack—they outlast anything ever before offered to the industry. . . . A letter will receive our prompt attention . . . write for details today.

LONGER LIFE

and here's why!!

The connector insert — hardened nickel, chromium steel for long life — readily replaced. New inserts give fresh-from-the-factory joint accuracy to a worn connector.

The bearing pin — its glass hard, smoothly ground, alloy steel surface contacts the inside of the equally hard connector insert, providing the most durable of all cutter chain joints.

The small rivet — easy to remove and replace.

The CINCINNATI MINE MACHINERY Co.
Spring Grove & Meeker St. CINCINNATI, OHIO

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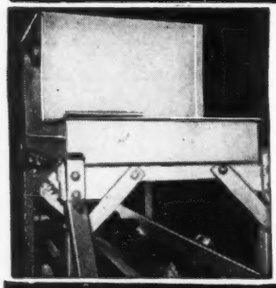


For Accurately Weighing Moving Loads

The Merrick WEIGHTOMETER provides an accurate means of weighing while conveying coal on the main conveyor belt delivering coal to tipple.

Moving loads can also be weighed and recorded accurately on belt conveyors underground, up a slope or adjacent to the tipple.

Let us show you how easily you can keep accurate check on tonnage with the Merrick WEIGHTOMETER.

Ask for bulletin 375

MERRICK SCALE M'FG. CO., Passaic, New Jersey

motor, where current flowing in the armature and field circuit is of the same value. The field coils consist of a relatively few turns of a large-sized conductor where one field-coil turn has a high ampere-turn value. The motor torque is proportional to the product of the field strength and armature current. Also, for any change in the field flux or ampere turns, the armature tends to adjust its speed to develop the proper balancing counter-electromotive force to maintain the proper current value.

"Therefore, when field coils have internal defects, such as short-circuited turns, the resistance of the field circuit is lowered, and the field coil or coils with shorted turns have a lower resistance than a normal coil with consequent lower ampere turns. Thus the tendency is to weaken the field and the motor will tend to draw more current for the same load if the armature cannot speed up."

As to the net results, Mr. Roe explains that "the remaining good field coils will heat up while the shorted coils will be at a lower temperature than the good coils—the defective coil or coils are the coolest coils. Thus one or more short-circuited field coils impose an overload on the remaining good coils in the motor. Under these conditions the armature may be overloaded, causing it to burn out. When this occurs the fields are overloaded still further and may be weakened to the point of failure when the motor is again placed in service."

In support of these rules and observations, Mr. Roe states that at a large mining property where the improved maintenance practice was put into effect, armature rewinds per year decreased from 204 to 94, although tonnage mined almost doubled. Also the system has been used for years with good results by a large railway property in the East.

•

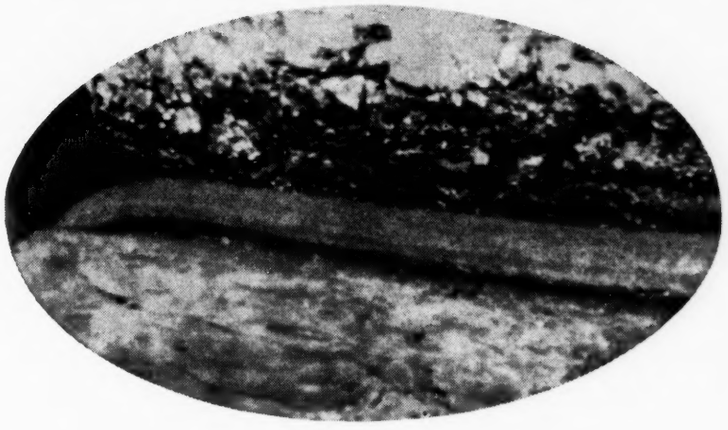
Monitor Dumping Controlled By Automatic Skid Brake

By a half-toggle action the reverse-travel brakes of the monitors perform automatically at the Capito mine of the Atlas Coal Co., Bell County, Kentucky. At this mine the two 9-ton drop-bottom monitors operate in balance on a 2,300-ft. incline. Dumping

Left-hand monitor brought to rest as rope weight started to pull it back over the dump. Chains are tight, thus limiting the shoe swing to a position of maximum lift and pressure.

takes place as the loaded monitor is pulled slowly back over the tipple dump bin. Without a brake the weight of the rope riding high over the swags would pull the loaded

The jugular of a coal mine...



That's what power cable is. It distributes power the way arteries and veins distribute blood. Failure means the end of things.

The Wise Coal & Coke Company of Wise County, Virginia, wisely chose Anaconda wires, cables and accessories for their power distribution system. Like so many other operators, this company knew how healthy and vigorous . . . how long-lived and efficient . . . were Anaconda products. Almost a complete year of perfect operation bears out their conviction.

So, if you need any kind of wire or cable for your mining operations, look to Anaconda. You'll find us ready with the highest quality products... every one backed by the most painstaking research in the industry.

40373

At the Wise Coal & Coke Co., Wise County, Va.

Here is a partial list of Anaconda equipment that is keeping this company's operation "alive" and thriving.

Anaconda Duraseal D. D. rubber and braid cable carrying power into the mine at 2300 volts.

Anaconda iron boxes where joined cable splices are required.

Anaconda Securityflex, insulated for 600 volts, for 440 volt distribution system.

Anaconda D. D. Duraseal No. 16 for telephone circuits.

USE MODERN IMPROVED *Anaconda Wire & Cable*

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City. Chicago Office: 20 North Wacker Drive

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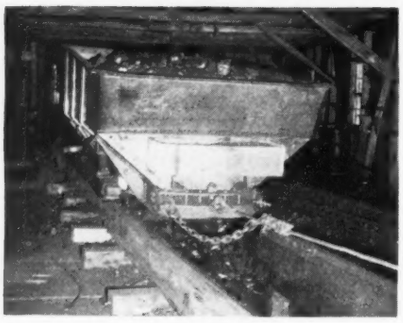


Right-hand monitor being pulled back over the dump against the action of the brake.

monitor rapidly back over the dump after the limit of run had been reached.

As indicated in the illustrations, the monitor brake, which is on one side only, drags on a timber spiked to the ties outside the rail. The brake shoe, which is practically as long as the monitor body, is hung by two pivoted rods which include turnbuckle nuts for close adjustment of length. When the loaded monitor travels in over the dump the shoe is swung by friction, thus raising itself so it presses only lightly on the wood rail. As rope weight starts to pull the loaded monitor back over the dump, friction causes the shoe to swing back the other direction until stopped at vertical by the chains. In this position the shoe takes a large part of the weight off the track wheels on that side. Then, as the loaded monitor at the top of the hill is eased off, the one at the bottom is pulled forward slowly to allow the three automatic drop-bottom doors to open gently and thus discharge the coal into the bin with minimum breakage.

•

Blocks Made by Tipple Crew Have Oil-Can Holes

A cement-block plant is operated by the tipple crew of the Puritan Coal Corporation, Puritan Mines, W. Va., when slack run or other difficulties stop the tipple for an appreciable fraction of a working shift. Holes in the blocks are formed by quart-sized empty tin cans from which motor lubricating oil was dispensed at the coal company's gasoline service station.

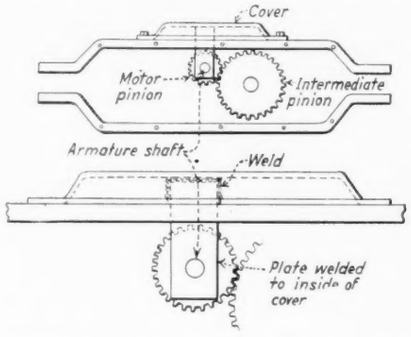
Harry Maynard, tipple foreman, is shown in the accompanying illustration directing his crew in mixing the concrete and tamping it into the wood form which makes ten blocks per set-up. Blocks are 8x16x6 in. The last dimension was fixed to correspond roughly with the height of the can. Sand is obtained from a near-by creek and the coarse aggregate consists principally of washer refuse, although track cleanings also have been used to some extent.

Primary use of the blocks is for permanent stoppings in the mine and it also is planned to use them to build a bosses' office on the hill near the lamp house.

•

Loading-Machine Motor Pinion Held On by Plate on Cover

Reading the Operating Idea on guarding loading-machine motors against the possibility of nuts coming off the armature shafts (September, 1940, *Coal Age*, p. 70) prompts John Gross, electrician, to tell how trouble from this source is avoided at the mine of the J. H. Somers Coal Co., Adena, Ohio. At this property, the nut holding the pinion on the armature shaft is entirely eliminated and the shaft is cut off flush with the pinion. To hold the pinion in place, a ⅜-in. plate is welded to the clutch-case cover so that it extends down over the end of the pinion, against which it bears lightly. The cover is held in place by four capscrews and can be quickly removed. If the retaining plate becomes worn and results in too much end play in the armature it can be built up by welding and then ground to fit. Pinion-retaining plates of this type have been in service since May, 1940, Mr. Gross states, and as yet no trouble has been encountered, even though the machines are double-shifted.



Showing how pinion-retaining plate is welded to the clutch-case cover.

•

Battery Servicing Improved By Using Valve Wrench

With a new tool the time required to remove, wash and replace valve groups of Edison cap-lamp batteries is greatly reduced and the hands of the man doing the work are kept from contact with the alkaline battery solution. This tool, termed a "double-acting storage-battery safety-valve wrench," was designed and is used regularly by R. B. French, lamp man at the Lake Superior Co., Superior, W. Va. It won a prize in the miners' gadget show at the Bluefield Industrial Exhibit held late in August.

R. B. French demonstrating his wrench.

The handle of the wrench consists of a tube forming a magazine in which the valves are stored. To remove a valve, the wrench is applied to the battery, turned until the working end drops below the valve lugs and then rotated about one-eighth turn to the left, thus unlatching the valve. This valve and others subsequently removed from batteries stay in the wrench. Putting the valves back on the batteries is done by reversing the operation and each valve feeds down automatically. Washing the valves is done by sloshing the magazine wrench and its contents in water.

If the tipple is down a few minutes the crew make concrete blocks.

The cushion that breathes with 200,000,000 latex lungs

Air-cell is a typical example of Goodrich development

BECAUSE air is one of the softest things there is, Goodrich engineers found a way to capture it for your comfort.

Seats in buses, cars, trains never stayed comfortable very long. Springs worked through, padding got lumpy — riders complained. Sponge rubber was tried but it is too coarse — not soft enough to adjust itself to your body and weight.

Goodrich engineers worked on the problem, finally developed a sponge with inter-connected cells so that air (or even smoke, as in the picture) passes through easily. There are 250,000 of these tiny cells to the cubic inch — more than 200,000,000 in a seat cushion, a *billion* in a mattress. And this sponge is made of pure latex which will last indefinitely.

Sit on a cushion of Air-cell, as this new development is called, and air rushes out of thousands of cells until the cushion is perfectly adjusted to every inch of your body, leaving you supported on the millions of tiny puffs of air that remain. Shift your weight and the cushion shifts with you — "breathing" in and out to adjust itself always to you and your comfort.

Cushions and mattresses have been made of this new Goodrich Air-cell, and upholstered furniture soon will be. It's 90% air but "*solid* comfort" to everyone who has tried it.

Economy for bus and train operators, relaxation for their riders — typical of the values to business and public which the constant research program of Goodrich assures.

The B. F. Goodrich Company, Akron, Ohio.

Goodrich

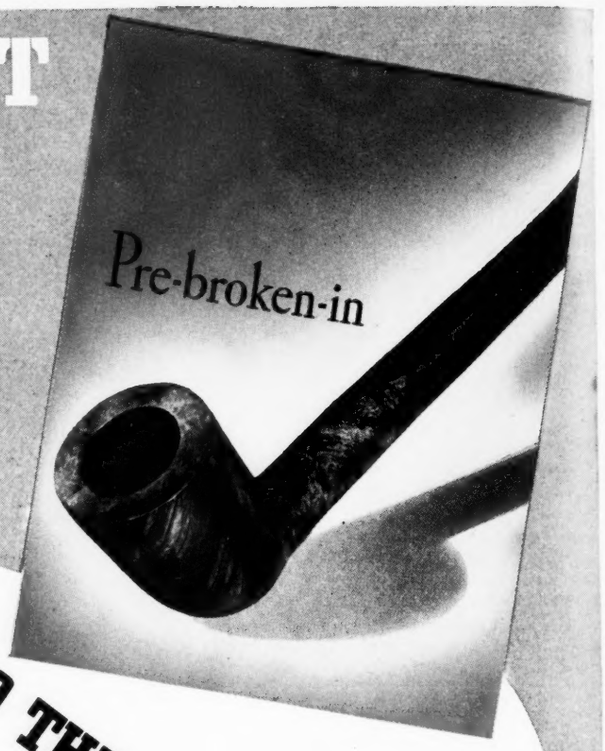
ALL *product problems* IN RUBBER

(Another story of Goodrich development appears on page 1)

HAZARD LAY-SET

Preformed

. . . IS PRE-BROKEN-IN TO THE JOB



● When you put Hazard LAY-SET Preformed on the job there is no need to "baby" it until it is "broken-in." Hazard LAY-SET Preformed is preformed at the mill—pre-trained to the job.

Take this single example for instance. Closing lines on some clamshell buckets must take terrific beatings because of small sheaves and reverse bending. It is in such places that LAY-SET Preformed proves its merit right from the start.

LAY-SET has the stamina to endure the punishment *much* longer than ordinary wire rope. That means fewer shutdowns, fewer rope replacements, steadier production, greater profits.

Write today to the Hazard district office nearest you and ask for the name of your nearby Hazard distributor. He will show you how to effect real economies in your machinery operation. All Hazard ropes made of Improved Plow Steel are identified by the Green Strand—and Green Signifies Safety.

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Established 1846

AMERICAN CHAIN & CABLE COMPANY, INC.

WILKES-BARRE, PENNSYLVANIA

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

WHAT'S NEW IN THE FIELD

Lowther Institute Weighs "What It Takes" To Be Foreman of Mechanized Mine

"MECHANICAL MINING is 10 per cent equipment and 90 per cent supervision. If this be true, how important must be highly efficient foremen." This declaration of J. J. Snure, division superintendent, Rochester & Pittsburgh Coal Co., was the gist of the discussion at the 25th meeting of the Thomas S. Lowther Mining Institute, held Nov. 9 in Indiana, Pa., under the chairmanship of George Steinheiser, State mine inspector.

Though the success of coal-mine mechanization has been proved, there is much more to mechanization than the purchase of equipment, pronounced J. T. Clark, assistant production manager, Pittsburgh Coal Co., adding that the mechanizing of a hand-loading mine introduces some rather complex problems. Mechanized mining is a chain of operations where each separate phase must be balanced with both the preceding and the subsequent operations. With hand loading, a mine foreman's slip which threw men out of work did not mean much. Usually, the mine was sufficiently overmanned that the men still able to work gladly loaded the extra cars which the men in the other section failed to get. So the day's tonnage still was normal. But if in a mechanized mine, a single loading unit is idle, its tonnage is lost and the other units cannot make up the deficiency, for they are working already to capacity.

Foremen must be able to select the right man for each of the various phases of mechanical mining. Each man must have a natural desire to do the kind of work selected for him. The foreman should appeal to the man's interest and find him a job similar to the one in which he previously excelled. The job must be put up to the loading crew as a problem to be solved. A foreman who thinks he does all the brain work and tries to take all the credit to himself makes a fatal error.

Training Fundamentals

Fundamentals in successful training are: (1) to break down the work into elemental parts and apply standard methods to each element, (2) to achieve correctness of method before seeking operating speed and big production, (3) never to induce a new employee so to accelerate his speed that it will endanger his safety, (4) to be patient with a new man and never despair of him because his first attempts are unsuccessful, remembering that workmen's mistakes usually result from lack of proper instruction and supervision.

Success depends on timing and cooperation—commonly termed "being on cycle." Any delay in removing slate, in timbering, drilling, tracklaying, cutting or in the supply of cars will seriously slow the entire cycle. Working places should be kept tidy so that an operator can maneuver his machine properly. Tight coal caused by gripping the rib in cutting, by improper placing or charging of drillholes or drilling an insufficient number of holes per face, will waste time. Seventy-five per cent of the delays due to mechanical failure arise from lack of adequate inspection, improper maintenance or repair methods, insufficient lubrication, or neglect of operator, foreman or mechanic to observe and report faulty equipment. "Accident prevention in mines is one-third knowledge or education, one-third supervision and one-third discipline," declared Mr. Clark, quoting a mining man of wide experience in mechanization, adding for himself that experience sells its lessons dearly to a non-receptive mind. Doing is not always closely correlated with need to do. Failure is the only thing that can be achieved without effort, and a fatal way to failure is to procrastinate.

When a company installs new type equipment it should send a foreman or foremen to an operation that is employing successfully the kind of machines it proposes to use so that he or they can study the machines and that company's system, said Mr. Snure. The foremen should be allowed to stay for at least three months, working and training under a competent foreman. This probably would cost about $500 but should be repaid many times in the first year the equipment is operating. Then, when installing more equipment, the foremen chosen for the new sections should be trained in the sections already working. The only difference between hand and mechanical loading lies in the intensity of application which steps up the speed with which decisions must be made.

Many a foreman on hand loading will not open a book after he has obtained his certificate, but the successful mechanical foreman must continually study and learn new methods. Most companies are encouraging training programs such as State College is sponsoring for the R. & P. Coal Co. A foreman to be successful must realize that everything that keeps down his output is part of his responsibility. If a machine breaks down, he cannot sit back and say: "Well! That's the maintenance department's baby." It's up to him to find out why he had an outage; not to blame it on someone else but to eliminate further trouble of this kind.

In hand loading only two to four men work together and divide their earnings, but, today, 30 men on a single shift may send their coal to one belt, pooling their output. If the operation runs three shifts there will be 90 men and they cannot be made to cooperate in a division of earnings, so the three foremen must pull together. Such men must be cost-conscious. Even before his superiors, a gang foreman should know if the output per man is dropping and cost is rising and should be able to say why and should contact with his superior with a logical explanation before his superior has an opportunity to contact with him.

No Rush, But Steady Flow

A mechanical foreman must be cool-headed and give his instructions clearly, quietly and firmly so as not to excite his crew, for, in this rapid method of mining, an excited man easily can injure himself or others. It is not excessive or dangerous speed that makes big production but steady flow with no wasted seconds. The foreman should distinguish between a man who works in a hurry and a fast worker. Some foremen and their crews are so production-minded that they overlook safety. However, if a crew is production-minded, the foreman can concentrate on safety training.

Today's foreman must know men and "what it takes" to do the various jobs between face and loading point, declared J. F. Simpson, superintendent, Clearfield Bituminous Coal Corporation. He must choose his men not so much for their experience as for their innate ability. He must be a man-manager just as truly as a work-manager. He must be the managerial type of person, one who gets keen satisfaction in dealing with men, and the management must assist him by taking him into full confidence, giv-

Coming Meetings

- Winding Gulf Operators' Association: annual meeting, Dec. 6, Beckley, W. Va.
- Coal Mining Institute of America: annual meeting, Dec. 12 and 13, Fort Pitt Hotel, Pittsburgh, Pa.
- Indiana Coal Mining Institute: annual meeting, Dec. 14, Hotel Deming, Terre Haute, Ind.
- Pocahontas Electrical and Mechanical Institute: annual meeting, Dec. 27, Bluefield, W. Va.
- American Society of Heating and Ventilating Engineers: annual meeting, Jan. 27-29, Hotel Muehlebach, Kansas City, Mo.
- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 17-20, 1941, Engineering Societies Building, New York City.

ing him all information and plans in an attempt to develop in him a proper understanding of the problems in hand.

In discussion, Mr. Clark urged that no one should undertake mechanization of a mine without going, with the foremen who will have charge of the work, to see what others are doing, visiting the selected mine early in the morning before a set-up can be arranged. Everyone wants to have the work inspected when it is running smoothly, but more is to be learned from seeing the difficulties in operation.

Modern explosives, explained H. D. McGinnis, technical representative, E. I. duPont de Nemours & Co., generate only a quarter of the gases liberated by the former nitroglycerin explosives. One is unfavorably impressed by the quantity of gas generated by the explosion of 1½ lb. of explosive, but that quantity in many cases will charge all the holes in a cut.

It has been said that 75 per cent of efficient face preparation is drilling. The coal should not be drilled before cutting, but sometimes that may have to be done. Too often an insufficient number of holes is drilled. To drill an extra hole may take only two or three minutes, but the tight coal caused by insufficient drilling may cause the loader to waste ten to twelve minutes. Besides, tight coal increases the maintenance costs of the loading machine.

Well-Shot Coal Saves Cycle

Holes in 4-ft. coal should not be more than 6 ft. apart. Tight coal will break up a cycle. With coal 3 ft. thick, undercut 9 ft., air spacing is almost essential, but it cannot be done unless the mine inspector first approves of its use. It must be remembered that in testing explosives 1½ lb. of explosive is fired into gas and dust in the most dangerous percentage. It must not ignite this mixture. With a nitroglycerin explosive and a 6-ft. cutter bar, air spacing may be taboo, but, with a 9-ft. undercut and with 8 ft. of coal to shoot up and with a slower powder, conditions are different. The shorter and cooler flame should make it permissible to use 2½ lb. of explosive in a hole. It should be at least as safe as 1½ lb. of nitroglycerin powder. It is best to use Class A powder, not because it is much better than Class B, for the latter powder may be so near the border as to be unobjectionable, but attorneys have a way before a jury of emphasizing such minor differences.

In the district centering around Indiana, no anxiety need be felt about using sufficient explosive to obtain good face preparation from a loading viewpoint. In the Pittsburgh district, there is a keener interest in not shooting the coal too hard.

Good mechanization foremen are born, not made, acknowledged G. R. Spindler, mining extension department, West Virginia University, but not enough have been born; so a training plan is needed. Such training work was started by the university in 1914; and this year, evening classes were initiated, and 2,000 students are enrolled. All the programs of the university have been framed in contact with the operating personnel of the mines so as to be assured that the plan is operational rather than academic.

Dr. Wickenden has said of engineering education that it should deal with fundamental rather than specific problems so that every problem will be regarded as new, to be solved on the basis of its fundamental principles. This, it seemed to the speaker, applies not only to engineers but also to foremen, and therefore job analysis is essential. Experience depends on what we see, not only on what we merely have an opportunity to see.

A young trained man will have his experience so intensified by his training that he will know more in a short time than a man who has been all his life at the face. To illustrate, the university describes the reverse curvatures where roof bends over the edge of a pillar as explaining the fact that the first and last lift of a pillar are the most dangerous of any, for the reverse curvature has weakened the roof or fractured it. The trained foreman accordingly learns to look for such weakness.

In the course, cost analyses are explained. Recently, a foreman sent back a cost analysis of his working place as incorrect and proved it was erratic. A few years back, he wouldn't have known it was wrong and wouldn't have cared if it had been. Hence, said Mr. Spindler, we are progressing.

Time studies also are explained. A machine is dismantled and reassembled by the students. True, it may not be the exact duplicate of the one they will have on their job but it will give them some knowledge of machine handling. Wiring-control diagrams and the controls themselves are available. Job manipulation has been pitted for years against principles of mechanics. Dr. Spindler favored the more fundamental study.

In the opening address, Dr. Leroy A. King, president, State Teachers' College, Indiana, said that it was his expectation that his college would teach its students to give mining instruction in mine villages.

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Oct. 1, 1940	P.C. Change From Sept. 1 1940	From Oct. 1 1939
Electric power utilities	11,410	+4	+44
Byproduct coke ovens..	8,861	+13	+42
Steel and rolling mills.	690	+4	+20
Railroads (Class 1)....	5,660	—0.6	+30
Other industrials*	15,556	+8	+39
Total	42,177	+6	+39

Bituminous Coal Consumption

	Thousands Net Tons Sept. 1940	P.C. Change From Aug. 1940	From Sept. 1939
Electric power utilities	4,138	—5	+2.8
Byproduct coke ovens.	6,624	—1	+2
Steel and rolling mills	752	—5	—2
Railroads (Class 1)...	6,595	—0.1	+1.6
Other industrials*....	8,624	—0.09	+5
Total	26,733	—1.3	+7

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of October, 1940, net tons	38,300,000
Per cent decrease from Oct., 1939	17.4
January-October, 1940 tons...	373,621,009*
Per cent increase over Jan.-Oct., 1939.....	17.3

* To Nov. 2.

Anthracite

Month of October, 1940, net tons	4,234,000
Per cent decrease from Oct., 1939	17.7
January-October, 1940, net tons	41,484,000
Per cent decrease from Jan.-Oct., 1939.....	4.8

Sales of Domestic Coal Stokers Vs. Oil Burners

Sales	Coal Stokers	Oil Burners
September, 1940.....	30,951	32,425
Per cent increase over Sept., 1939.....	54.0	14.7
January - September, 1940	107,138	137,511
Per cent increase over Jan.-Sept., 1939.....	52.7	21.8

Index of Business Activity*

Latest week.....	139.6
Per cent gain over month ago	3.8
Per cent gain over year ago..	13.0

* Business Week, Nov. 16.

Electrical Power Output

Week ended Nov. 9, kw.-hr....2,719,501,000†	
Per cent increase over month ago	1.2
Per cent increase over year ago	8.2

† Edison Electric Institute.

Research Program Launched At Battelle Institute

Bituminous Coal Research, Inc., research agency of the bituminous coal industry sponsored by the National Coal Association, has launched its contemplated three-year $200,000 program of research aimed to advance the competitive position of coal by the development of better equipment for its use in home and industry. Following the plan adopted in the previous 3½-year program of the corporation, Howard N. Eavenson, B.C.R. president, has completed arrangements with Clyde E. Williams, director, Battelle Memorial Institute, Columbus, Ohio, to carry on the program there.

Included in the broad program of research will be studies of methods by which close control of heating and smokeless operation may be combined with the natural advantage of coal as a low-cost source of energy. The direct application of coal as a fuel for metallurgical and ceramic furnaces, methods for the complete gasification of coal for industrial and residential use, and the direct conversion to mechanical energy through the use of coal in a new type of internal-combustion engine are among the problems to be attacked.

That the many thousands of low-cost homes of the country may have cooking and heating stoves that are smokeless and require the minimum of attention, the kitchen ranges and space heaters will occupy a prominent place in the program. In line with the previous program, residential stokers and coals for use in them will be the subject of investigation that the day may be hastened when completely automatic heat with bituminous coal will be readily available to all.

Further research on materials for dustproofing coals, with particular attention to those porous coals now difficult to treat economically, is expected to broaden the distribution of coal that is clean to handle.

With approximately 25 per cent of the country's coal tonnage already enlisted in the project, participation in the movement is

"Gulf MINE CAR GREASE *helps our locomotives pull more cars!"*

. . . says Coal Mine Maintenance Man

The rotary dump shown above is making an excellent record of low-cost operation with the right Gulf lubricants in service. *(Left)* The Maintenance Man and the Gulf Engineer inspect a bearing of a mine car wheel. These bearings show little wear after long periods of service when lubricated with Gulf Mine Car Grease.

"Gulf's higher quality lubricants insure longer service and lower maintenance costs for mechanical equipment in our mine."

"OUR experience with Gulf's higher quality oils and greases proves their value to operations like ours," says this Mine Maintenance Man. "In this model mine, Gulf lubricants save money for us every operating hour by reducing friction losses and resulting repair expense."

If high maintenance costs are cutting into your mine's profits—call in a Gulf engineer and ask him to tell you about GULF PERIODIC CONSULTATION SERVICE, and how it will help you guard against undue wear and lost efficiency. This modern lubrication service is helping many mines to improve production and make real dollar savings—it can go to work for you immediately, *at no extra cost!*

Gulf higher quality oils and greases are quickly available through 1100 warehouses in 30 states from Maine to New Mexico. 'Phone or write your nearest Gulf office today.

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open to all interested in the advancement of the interests of bituminous coal. E. R. Kaiser, assistant to the B.C.R. president, who was active in enlisting the support of the producers and the railroads, will continue his efforts to enlarge the scope of the program to a size commensurate with the importance of the industry.

A technical committee of fuel engineers representing the companies participating in the program will cooperate with the laboratory in the progress of the work. A smaller advisory group will meet with the research staff at frequent intervals to discuss the latest developments and to steer the program. At Battelle, Ralph A. Sherman, supervisor of the fuels division, will direct the work.

•

More Producers Join Code; Members Total 13,573

More than one thousand producers have joined the Bituminous Coal Code since minimum prices became effective on Oct. 1, 1940, according to report by Director Howard A. Gray of the Bituminous Coal Division. This brings up to 13,573 the number of producers participating in the market stabilization program set up under the Coal Act. They produce practically all of the coal consumed in the United States, leaving less than 850 extremely small producers remaining outside the code.

The director stated that now that minimum prices have been established, the Division will be more strict in setting the date upon which a new code membership becomes effective. When they join the code, producers become exempt from the 19½ per cent tax which the Coal Act levies on the sale of coal. However, they may not sell their coal at less than the minimum prices prescribed without risking loss of their code membership and the penalties under the law.

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New 20th Century Mine To Be Opened

A new mine is being prepared for opening by the 20th Century Coal Co., Winslow, Ind. The new operation is five miles southeast of Oakland City, Ind., on the Algiers, Winslow & Western Ry., and will tap the No. 5 seam, running from 51 to 66 in. thick. A tipple which the company erected some time ago at Muren has been torn down and part of it used in constructing a tipple at the newer operation, which will have a capacity of 2,000 tons per day.

•

Preparation Men Organize

Southern Illinois Engineers and Chemists, promoted by the coal-preparation men of southern Illinois, was organized Nov. 1. Monthly meetings will be held at the Lymar Hotel, Herrin, Ill., the second Friday of each month. Officers are: president, Lee Hazen, Bell & Zoller Coal & Mining Co.; first vice-president, Ray Bridges, Southwestern Illinois Coal Corporation; second vice-president, J. A. Bottomly, Sahara Coal Co.; secretary-treasurer, O. E. Campbell, Shell Oil Co.

Making Coal More Efficient and Useful Theme of Birmingham Meeting

HOW TO IMPROVE the mine product and how to use it more efficiently at the plant were major themes at the fourth joint meeting of the Coal Division, American Institute of Mining and Metallurgical Engineers, and the Fuels Division, American Society of Mechanical Engineers, held Nov. 7-9 at the Hotel Tutwiler, Birmingham, Ala., in cooperation with the Southeast Section, A.I.M.E., and the Birmingham Section, A.S.M.E. Non-fuel uses for coal and its place in the national-defense picture were further topics, along with sampling and testing methods, modern power-plant design, etc.

Coal no longer is the only source of energy, whether chemical or thermal, in the steel industry, declared A. W. Gauger, professor of fuel technology, Pennsylvania State College. The downward trend in its use in this field "must be taken as a warning sign and must stimulate the coal producer to an analysis of the situation."

The blast furnace is the largest single consumer of coke, and during the past twenty years pig-iron-production efficiency has constantly increased, reducing the consumption of coal per ton from 2,375.2 lb. in 1918 to 2,017.1 lb. in 1938. "The second factor in the decrease in the relative tonnage of coal used by the steel industry ensues from shifts in fuels resulting from changes in technology within the industry itself." More and more scrap is being used and, since most of it is melted with gas or fuel oil, with a corresponding decrease in coke consumption for ore reduction, the net effect is a loss to coal. Total scrap consumed in 1939 was 32,234,407 gross tons, equivalent to 65,000,000 tons of iron ore, which would have required about 55,000,000 tons of coal to reduce it. Scrap use in 1940, it is predicted, will aggregate 45,000,000 tons.

Referring to a study by H. V. Flagg, American Rolling Mill Co., Prof. Gauger called attention to changes in types of fuel used in finishing steps. In one plant, 4,033 lb. of coal, either natural or as a source of producer gas, was used to produce 1 ton of auto-body sheets in 1927. In 1940, the total coal equivalent was 2,380 lb., of which actual coal was 1,525 lb., the rest being natural gas and fuel oil.

Coal Can Meet Competition

Therefore, declared Prof. Gauger, the coal producer must not only strive to produce the best possible coal for coking but also must study the demands placed upon the fuel by changing industry techniques. "The most important factor is that many operations in steel making have become precision operations requiring very close control," thus tending to favor oil and gas where available at a reasonable cost. To compete under these circumstances, coal may have to assume a more fluid form. Hydrogenation is a possibility, although too costly at present. Pulverized coal may be called upon, along with such other modifications as gasification of coal and "colloidal fuel." Blast-furnace gas may be enriched with coke-oven gas; gas producers may be improved or a mixture of blast-furnace gas and pulverized coal may be possible. And further study of "colloidal fuel" might reveal major advantages.

Greater efficiency and lower cost will stimulate coal, observed A. C. Fieldner, chief, technologic branch, U. S. Bureau of Mines, who also stated that progress is being made in more accurate control of coal somewhat on the order of fluid fuels. Much thought now is being given to gas-producer design, particularly the smaller units. R. A. Sherman, Battelle Memorial Institute, foresaw substantial possibilities in producer- or water-gas sets, preferably the latter because of their advantages. Prof. Gauger called attention to the stress on small sets in other countries. The oxygen producer, he felt, deserves careful study.

Users Not Upset by Defense

"National defense should not create a dilemma in coal utilization such as obtained during the World War," declared J. E. Tobey, vice-president in charge of engineering, Appalachian Coals, Inc. Because of the heavy demand for metallurgical coke, the defense program's first impact will be an enlarged demand for coking coals. Coke gradually will be withdrawn from the domestic market, and steam coals will be called upon to bridge this gap, as well as the gaps caused by withdrawal of coking types from the steam market and by limitation of petroleum products to their primary applications. And as coals of higher quality are earmarked for special applications, lower-quality types will move up in favor.

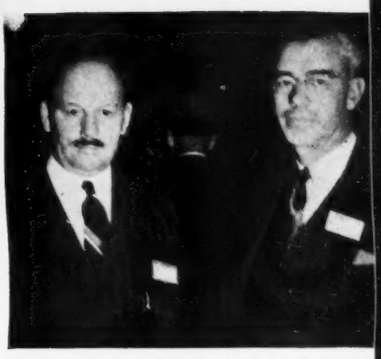
Coke withdrawals will stimulate domestic stokers, with resultant increase in production of small slack—a byproduct of stoker-coal preparation now being used in pulverizers and spreader stokers. "This, in turn, may influence the installation of more of this equipment and it probably will stimulate the recovery of a small-sized stoker coal from this byproduct. It already has been proved that certain coals of good quality in $\frac{1}{4}$ x $\frac{3}{8}$ in. or intermediate top and bottom sizes give admirable results in domestic stokers."

If allotment and distribution of coal again should be necessary, "it is most important that a sound plan be devised which will insure an intelligent and efficient placement of coals," especially in the case of industrial plants. If such control should seem necessary, "steps should be taken early to tabulate the requirements of every coal-burning industrial plant in the nation." From the transportation standpoint, favorable items are long-range planning by the railroads and improved river facilities.

To secure the better utilization of coals under the speed-up of the preparedness program, however, better appreciation of the basic principles is a necessity, contended Mr. Tobey. Continuity and uniformity of power services are the vital factors in coal selection, and emphasis therefore should be placed on using the same coal continuously. Mixing should be avoided, although scientific blending may be a help. Buying in large lots should be adopted. The results are a higher steam-producing capacity, greater continuity and uniformity of operation, re-

Meeting chairmen John M. Gallalee (left) and Milton H. Fies, vice-president DeBardeleben Coal Corporation, pose for their picture.

All set for a session are (left to right) J. W. Sheally and R. C. Montgomery, DeBardeleben Coal Corporation; B. W. Gandrud, U. S. Bureau of Mines, and C. J. Franklin and Y. U. West, DeBardeleben.



East meets Middle West—R. L. Rowan, General Coal Co., exchanges opinions with K. R. Bixby, Midland Electric Coal Corporation.

D. H. Davis, Pittsburgh Coal Co., and H. S. Salmon, of Salmon & Cowin, get ready for another meeting.

Paul W. F. J. Moran, preparation manager, Pyramid Coal Corporation, and O. W. Rees, Illinois State Geological Survey, pass time of day.

Part of the Pittsburgh Coal Co. delegation: left to right, E. C. Skinner, Adolf Kamphausen, C. Dean Ramsden, D. H. Davis and A. G. Gossard.

R. J. Blair, Tennessee Coal, Iron & R.R. Co. (left) poses with W. C. Chase, W. J. Turner and B. E. Patterson, Alabama By-Products Corporation.

L. A. Shipman, Southern Coal & Coke Co., Knoxville, Tenn. (left), with C. C. Boler, Illinois Geological Survey

Intersectional meet—J. R. Cudworth, School of Mines, University of Alabama, and Milton H. Fies look on while Walter B. Jones, director, Alabama Department of Conservation, is greeted by W. B. Plank, mining department head, Lafayette College.

E. J. McCrossin, chief mine inspector for Alabama, pauses for a Coal Age snapshot.

Howard A. Thomas, Cane Creek Mining Co. (left), and A. F. Harper, Woodward Iron Co., stop for a chat after the banquet.

New Alabama recruit is M. E. Haworth, chief engineer, Alabama By-Products Corporation.

duced maintenance costs, simplified and clocklike railroad delivery, reduced coal inventory, contented operating personnel, fewer management difficulties and better producer-consumer relationships.

Evaluating coal in combustion tests was the subject of a progress report by R. L. Rowan, fuel engineer, General Coal Co., who observed that three subcommittees are working on information required to describe the coal as supplied to the combustion equipment; observations to be made in tests to evaluate coal for use in underfeed stokers; and observations to be made in tests to evaluate coal when burned in suspension.

A laboratory-type continuous coal pulverizer which permits direct measurement of the net power required was described by W. H. Coghill, Southern Experiment Station, U. S. Bureau of Mines. Study of the circulating load built up in the unit, Mr. Coghill felt, might show some relation with the nature of the coal.

Coal Is Dried in Many Ways

Opening a symposium on coal drying, Myron W. Mellor and C. H. J. Patterson, McNally-Pittsburg Mfg. Corporation, in a paper read by Mr. Mellor, described the McNally-Vissac heat dryer, in which drying is done on shaker screens down through which hot gases from a furnace are drawn by an exhaust fan. A pulsator interrupts the air flow at intervals. Water is removed by both alternate squeezing and loosening of the coal bed on the screens under the influence of the interrupted air current and evaporation. The dryer also includes a cooling stage.

An Indiana installation employs dryers 66 in. wide and 20 ft. long, in which the coal stays about 50 seconds. It was designed for a feed of 190 tons per hour of ¾-in.x½-mm. coal, reducing total moisture from 19 to 9 per cent. On one test, with a feed of 175 tons per hour, of 19.3-per-cent-moisture coal, yield was 156 tons of 9.2-per-cent-moisture coal. Temperature of the coal to the dryer was 78 deg. F.; from the dryer, 112 deg. Mechanical action reduced the moisture to 15.4 per cent, with heat on down to 9.2 per cent. Two men operate the plant. Power demand on this test was 224 kw.; fuel requirements were 4,700 lb. of 12,200-B.t.u. coal per hour.

Drying of coal in the mill while grinding results in large savings in equipment, building and operating costs, in addition to a possible net gain in boiler-plant efficiency of approximately 0.5 per cent, declared M. E. Fitze, senior test engineer of power plants, Wisconsin Electric Power Co. Use of an auxiliary cyclone in the mill-vent circuit, with return of coal recovered to the mill, keeps coal loss from the system down to about 0.25 per cent.

Two major trends are focussing attention on simpler, more flexible coal-drying equipment, said W. S. McAleer, vice-president, Koppers-Rheolaveur Co. Mechanical mining underground and increased stripping necessitate more mechanical cleaning and washing. Secondly, demand for small stoker sizes is growing and specifications are becoming more rigid.

The centrifugal dryer, declared Mr. McAleer, has proved more economical for reducing moisture in ⅜x0-in. coal from 15 to 25 per cent down to 5½ to 8 per cent, although attempts have been made to get similar results by using screens and discarding fines. The cost, however, is in excess of heat-drying in modern equipment. Screen-type heat dryers were developed some four years ago better to fit plant requirements at a lower cost and with less loss of mill head. A new type employing an upward current of heated drying gases was described by Mr. McAleer, who pointed out that fines through the upper deck dropped onto plates on the bottom deck for further contact drying. This type of dryer also is adaptable to sizing the feed and includes a cooling section.

Operating on a ¼x0-in. Pocahontas coal containing 59.5 per cent of minus ⅛-in. material and 21.5 per cent of minus 28-mesh material, a dryer of this type 27 ft. long, Mr. McAleer related, was able to handle 5 tons per hour per foot of width, reducing the surface moisture from 11.5 to 2.9 per cent. Average depth of coal on the dryer deck was ½ to ¾ in. Coal remained in the dryer about 40 seconds and left at 125 to 140 deg. F. with the cooler inoperative. With the cooler working, the temperature was reduced 15 to 40 deg. F. more.

The flash dryer, said H. F. Hebley, product control manager, Pittsburgh Coal Co., will handle filter cake and similar material and also provides an opportunity for using an inert gas as a drying medium. Drying by surface contact has been done in Germany, using regenerative equipment also adaptable to filter cake. Continuing, Mr. Hebley said that drying can be divided into three phases: (1) free removal of surface water; (2) removal of small patches in cracks and depressions, during which the rate falls; and finally (3) subsurface drying down into capillary tubes and other openings into the interior of the piece. In the latter instance, a pulsating air current permits the moisture to work out. By using a process in which the water vapor is progressively recondensed on the coal, giving up its sensible heat, a stage eventually is reached where the drying takes place from the inside without slacking or other effect on the surface.

A good way to remove water, observed O. C. Ralston, U. S. Bureau of Mines, is to raise its temperature and thus decrease its viscosity, or add something to it or use an electrostatic field to decrease its surface tension, both of which will make it run off more easily. Experiments along this line have been carried out by the Pittsburgh Coal Co., said D. H. Davis. These showed that only a small quantity of such agents are required to increase greatly the rate of drainage. Also, no special tests are necessary to reveal that centrifugal dryers and dewatering screens work better on hot summer days.

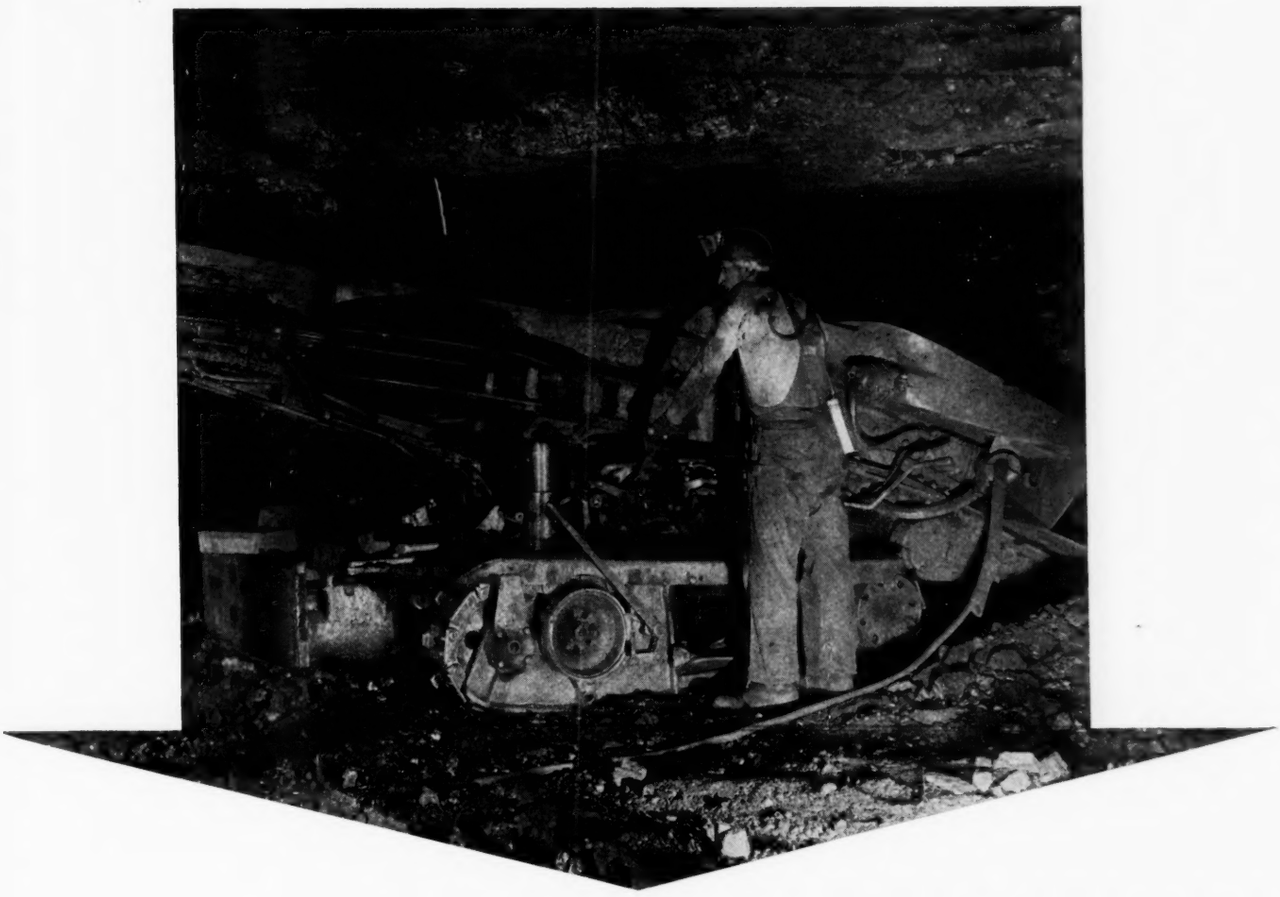
Stripper Makes Short Work of Road Building

The Correale Construction Co., Hazleton, Pa., one of the large stripping contractors in Luzerne County, has added a new shovel weighing 170 tons to its equipment. In moving the shovel to a new stripping location at Reevesdale it was necessary to build a 40-ft.-wide road. To do this, Palmer Correale put a "Caterpillar" tractor on the job. The road was through virgin forest, and rocky material was moved without blasting. The one tractor, cutting down trees as it went along, built the entire road. With the shovel now on the job, the tractor is building other roads from the stripping job down a steep hillside in order to facilitate loading of trucks.

Modern Boilers Lower Costs

Features of the Chickasaw steam plant of the Alabama Power Co., Mobile, designed for 900-lb. pressure and 900-deg. steam temperature, were described and discussed by E. C. Gaston and A. T. Hutchins. A cost of less than $2 per kilowatt more and an economy of 12 per cent were the reasons for the choice of a 900-lb. pressure over lower pressures. The possible savings with a still higher pressure, it was concluded, were not sufficient to warrant the increased cost and the plant would have been less flexible. In view of improvements in boilers, plus measures to forestall outages, it is expected that the single boiler installed, fired by pulverized coal and rated at 400,000 lb. of steam per hour, will be available for service over 95 per cent of the time.

A 40,000-kw. 3,600-r.p.m. turbo-generator was selected rather than an 1,800-r.p.m. unit because, even though the unit cost about $1.25 more per kilowatt, its efficiency was



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Perhaps your lubrication costs can be lowered as were the costs of this large Pennsylvania mine operator* who writes, "We have been using Cities Service grease in our Joy loaders and have found it very satisfactory. We have gone into the cost of lubrication with people from other districts and from their comments we believe our costs are very well in line."

The same operator writes, "Your engineers' service has been everything we might ask; they are at all times cooperating with us."

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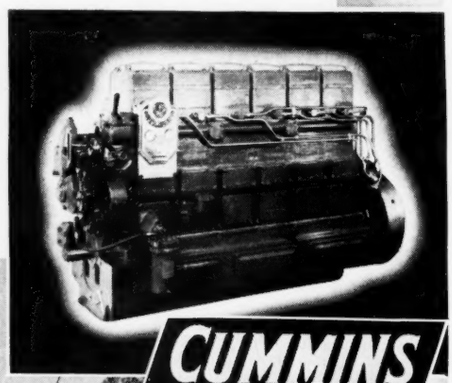
Model LI-600 Cummins Dependable Diesel. Horsepower: 250 at 1000 rpm. Displacement: 2309 cu. in.

F. H. and W. N. Dipple, Pennsylvania, stripping contractors, operate 2 Lima 1201 draglines, each powered with a Model LI-600 Cummins Diesel, also 6 Cummins Diesel-powered trucks. The drag shown here moves 1000 to 1200 yds. of material every 7 hours, using only 30 gallons of fuel. W. N. Dipple says: "I've tried them all and the Cummins Diesel can't be beat."



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1¾ per cent higher. Hydrogen cooling was adopted because of a substantial saving in windage losses with a moderate cost for hydrogen. As sufficient hydro capacity is available to carry the system load in certain seasons, over Sundays and at night, ample opportunity is afforded for inspection and maintenance at regular intervals, both at Chickasaw and the other steam plants in the system.

Possible uses for coal as an industrial mineral were abstracted by Mr. Ralston from a treatise prepared by himself and the late M. W. von Bernewitz, also of the Bureau of Mines. Starting with peat and observing that little or no true brown coal is found in the United States, Mr. Ralston pointed out that brown and black lignites are easy to hydrogenate and will furnish a fair volume of carbonization products. Lignites also supply activated carbons, free resins (black lignites), wood stains, fillers and pigments, in addition, with ground black refuse, to acting as a soil dressing to darken color, etc.

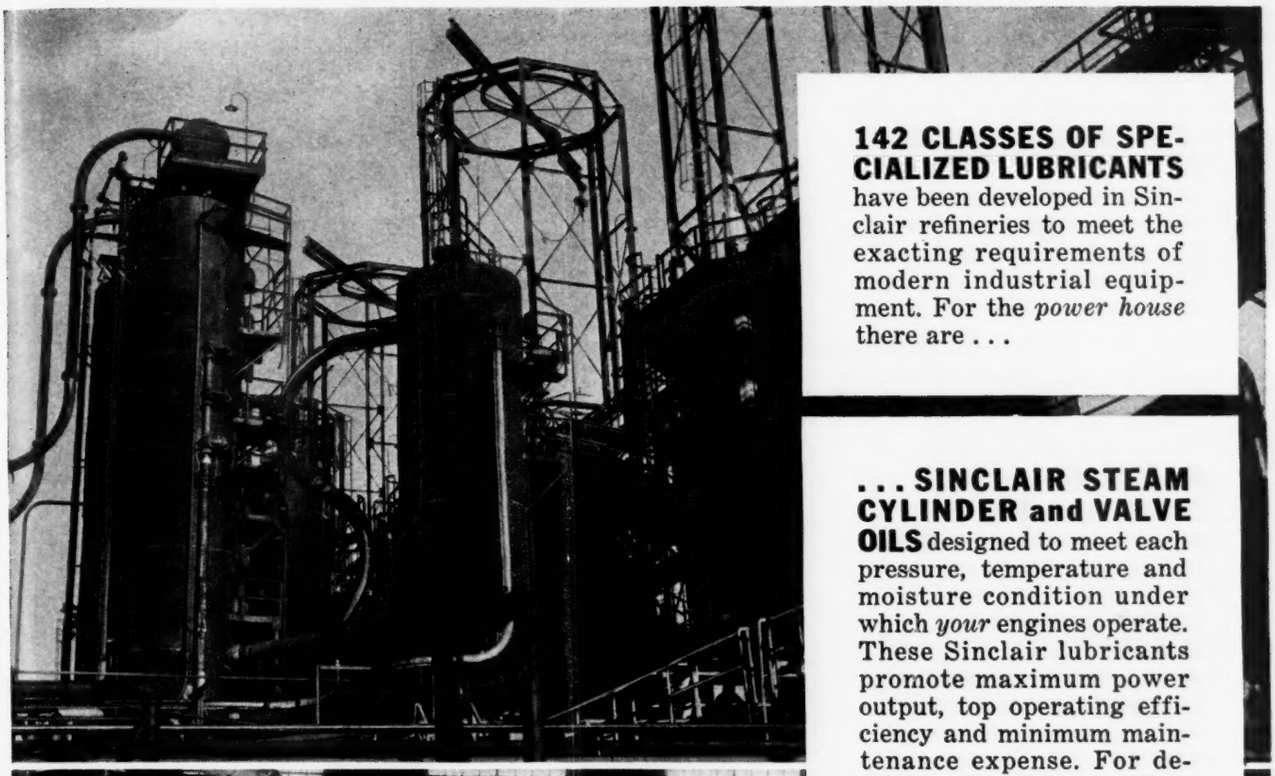
Many Uses for Coal

Bituminous coals in their raw state may be employed as soil looseners or dressing and treated to supply humic and ulmic substances. Ground coal is used as a filler. Coal also supplies a number of industrial gases and can be hydrogenated to produce a variety of useful hydrocarbons. When sulphinated, it makes a base exchanger for water softening. It is a substitute for bleaching earths, is used in foundry facing and is a lubricant and grinding aid in grinding other types of minerals, in addition to its adaptability to the production of many other products, including those resulting from carbonization and the like. Refuse, in addition to other possible uses, can be employed in the manufacture of water-treatment carbon, with fly ash making a good pozzuolanic admix for cement, etc.

Anthracite finds many non-fuel uses and is especially adapted to some because it furnishes durable particles. Every telephone set contains anthracite, and "Anthrafilt" is a steadily growing new use. Foundry facing, reduction of ores, manufacture of carbons and electrodes, and carbon forms and shapes are among the many non-fuel anthracite outlets. Anthracite ash is widely used, the cinders, for example, being in excellent demand in certain areas for concrete.

The effect of ash in coke and certain improvements in furnace design on the cost of pig iron was the subject of a paper by James P. Dovel, James P. Dovel & Co., read in his absence because of illness by Stuart J. Lloyd, University of Alabama. An excess of 2 per cent in ash in coke, declared Mr. Dovel, reduces blast-furnace efficiency 6 per cent, which is sufficient reason for its earnest consideration by preparation men. The efficiency of a blast furnace, he continued, may be increased some 16 per cent by enlarging the top section and introducing an inner-wall cooling system. Use of 8 to 10 per cent of raw coal in the fuel charge to the blast furnace cuts the cost of fuel around 5 per cent.

High turbulence is essential in water-cooled pulverized-coal furnaces, explained B. J. Cross, Combustion Engineering Co., at the Thursday afternoon session of the A.S.M.E. Fuels Division. Since the most active combustion is localized as near



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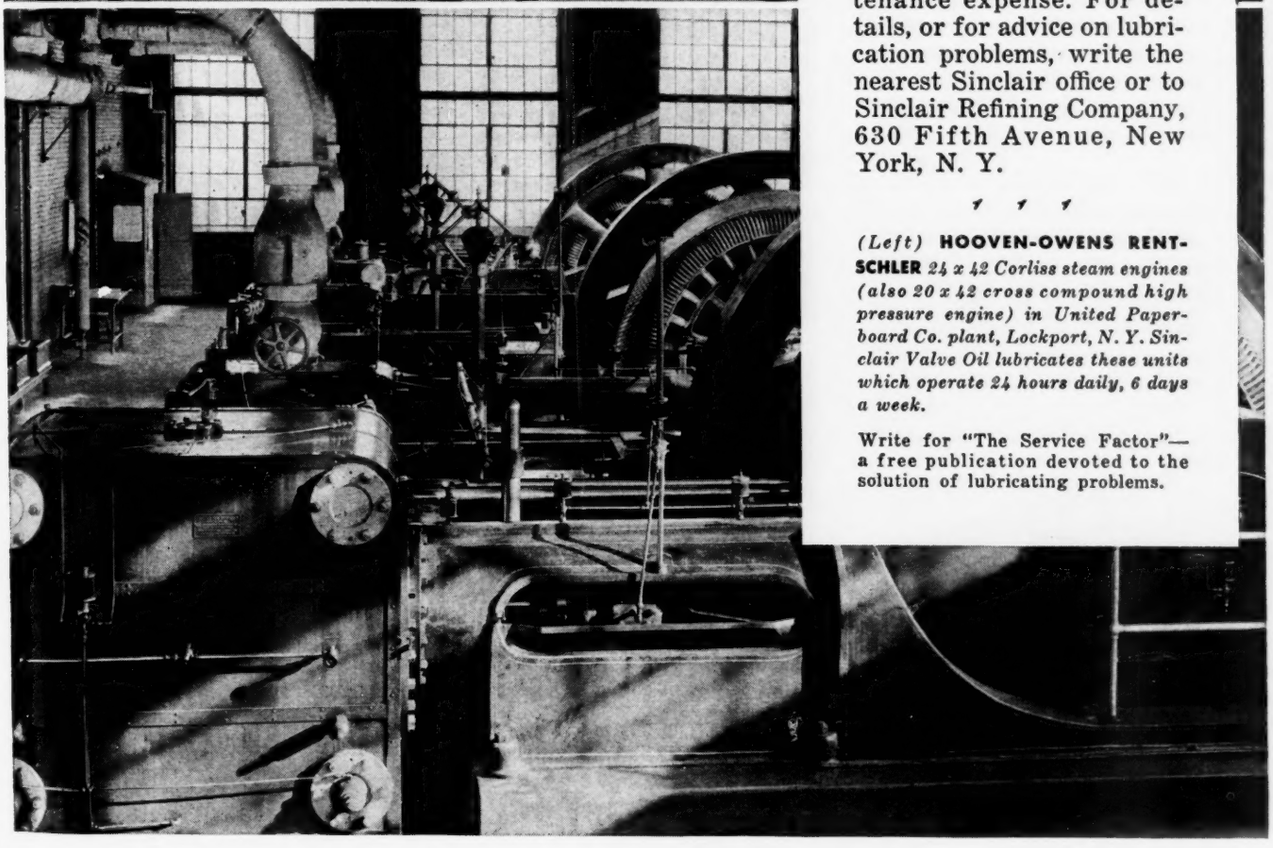
(Left) **HOOVEN-OWENS RENTSCHLER** *24 x 42 Corliss steam engines (also 20 x 42 cross compound high pressure engine) in United Paperboard Co. plant, Lockport, N. Y. Sinclair Valve Oil lubricates these units which operate 24 hours daily, 6 days a week.*

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



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These three BROWN-FAYRO Model RA Car Retarders spot railroad cars under the loading booms at this up-to-date preparation plant. Their economical purchase price is overshadowed only by their efficient operation. Investigate the profit-promoting possibilities of RA Car Retarders on your operations. Rope pull rates—8400 to 12,000 lbs.

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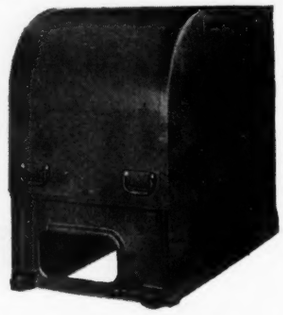
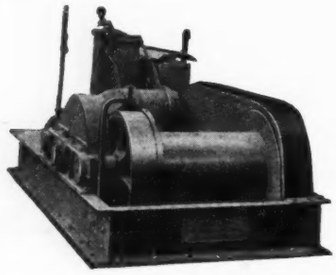
An electrically operated retarder, for use with both mine and railroad cars. Handles loads up to 12,000 lbs..—capacity—480 ft. of ¾" rope. Equipped with complete push-button control.





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as possible to the burner zone, intensive turbulence in that area is required to effect rapid mixing of coal and air. As combustion proceeds, the furnace atmosphere loses oxygen and becomes so diluted with the products of combustion that the last of the carbon must be burned in an atmosphere containing only 2 to 3 per cent oxygen. Continued turbulence, therefore, is desirable "to keep the loss due to unburned carbon within economic limits."

Turbulence is a factor, thought A. R. Mumford, Consolidated Edison Co., New York, which might well be considered by the joint committee on coal testing. Swelling in the heat of the furnace, remarked R. L. Rowan, General Coal Co., Philadelphia, Pa., may also affect the degree of turbulence. A high degree of turbulence, stated Mr. Cross, will localize the combustion zone. In the tests cited in his paper, high- and low-volatile coals showed the same turbulence characteristics.

During the past decade, said H. J. Kerr, Babcock & Wilcox Co., steam pressures in blast-furnace power plants have increased from 340 to 900 p.s.i. and steam temperatures have been raised from 650 to 850 deg. F. Largely as a result of the greater efficiency of high-pressure steam units, kilowatts per ton of product (surplus) increased from 41 to 53. There have been no material increases in boiler efficiency, however, or in the capacity of boiler units. Colored motion pictures of combustion and slag conditions in steam-boiler furnaces were shown by F. G. Ely, Babcock & Wilcox Co.

Coal Sampling Discussed

A preview of "a new conception of the principles underlying the prediction of accuracy in the sampling of coal" was offered by P. Nicholls, supervising engineer, Central Experiment Station, U. S. Bureau of Mines. The work of Mr. Nicholls and his co-author, B. H. Landry, associate fuel engineer, will be described in detail in a forthcoming Bureau publication. The condensed presentation covered the high spots in their study of sampling characteristics and the formulas developed in that work.

"The physical properties of the individual pieces of a lot of coal which are of concern in sampling for ash," declared the authors in summary, "can be expressed by two distribution curves: the ash percentage and the weight of the individual pieces, respectively, plotted against percentage cumulative weight of the lot of coal. The number of increments required for a given accuracy is related to the 'compound sampling characteristic' of the lot." Systematic sampling requires fewer increments than computed for random selection.

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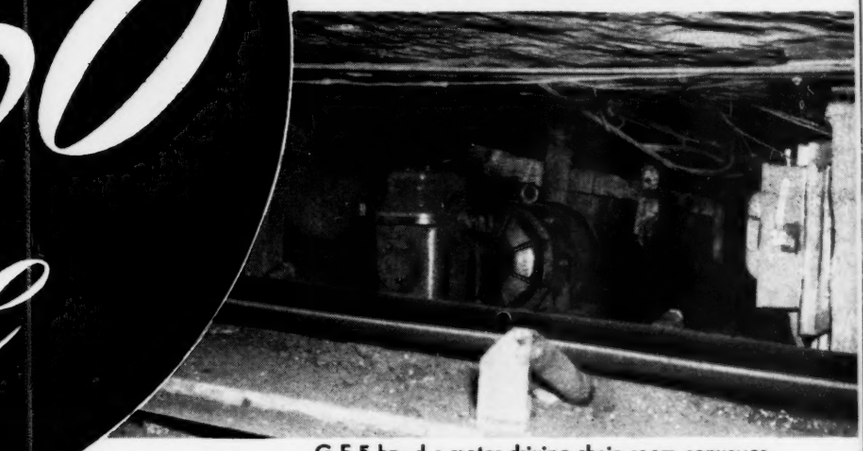
Personal Notes

F. S. Baird, general coal freight agent for the Norfolk & Western Ry., has been appointed assistant vice-president in charge of traffic as of Nov. 1. Joining the company in 1910, he was appointed coal freight agent in 1925, two years later was made assistant general freight agent, and became general coal freight agent last year.

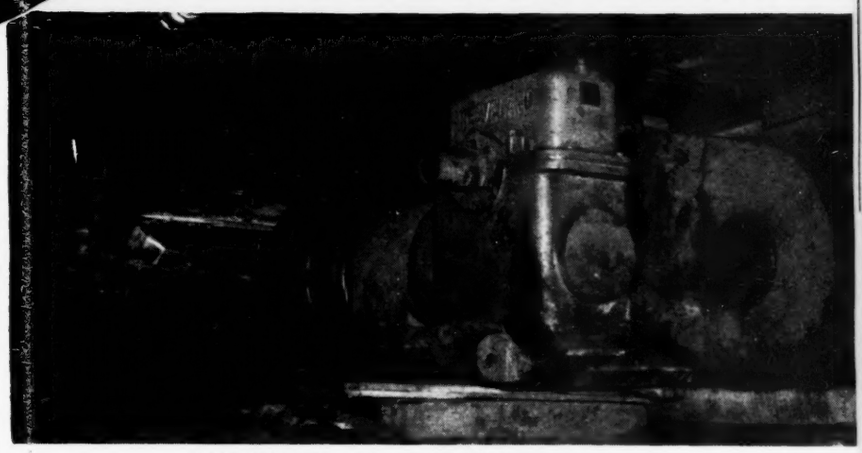
Charles W. Carson has resigned as mine manager at No. 6 mine of the Crescent Min-

These 3 and 150 more

G-E 25-hp, d-c motor driving mother belt conveyor



G-E 5-hp, d-c motor driving chain room conveyor



G-E 10-hp, d-c motor driving chain conveyor

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He seeks dust particles which may injure lungs, detects harmful or dangerous gases. He's always on the lookout for those things which cause sickness or accidents.

His work has much to do with lowering workmen's compensation insurance costs, raising levels of production.

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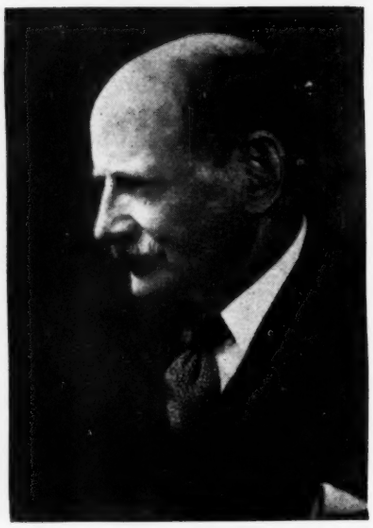


T. R. Johns

ing Co., Peoria, Ill., to accept the position of superintendent with the Edward Mohn & Son Coal Co., Bartonville, Ill.

W. C. COLEMAN has been promoted to district manager at Cincinnati, Ohio, by the Koppers Coal Co., effective Nov. 1. He has been with the company a number of years, recently at the Cincinnati office, in the Chamber of Commerce Building.

H. S. (HAPPY) COLLINS has become executive secretary of the Ohio Coal Conference, with headquarters in Columbus. He recently resigned as secretary of the Mahoning Coal Council, Youngstown, after five years' service.

M. G. CURRY, chief electrician, Ashland Coal & Coke Co., Ashland, W. Va., for the last twenty years, has been transferred to the Pemberton Coal & Coke Co., Affinity, W. Va., to act in a similar capacity.

P. D. EYRICH lately chief mining engineer with the National Coal & Coke Co., Sumiton, Ala., is now connected in a similar capacity with the Tennessee Products Corporation, Whitwell, Tenn.

T. G. FEAR has been appointed superintendent of the Sonman Shaft Coal Co., Sonman, Pa., operated by the Koppers Coal Co., on a management basis. Mr. Fear resigned the post of general manager of operations with the Consolidation Coal Co. in December, 1932, to become assistant to the president of the H. C. Frick Coke Co. On Oct. 1, 1938, he was made general manager of the Elk Horn Coal Corporation at Wayland, Ky.

HARRY L. GANDY SR., who has been on leave of absence because of ill health, has resigned as chairman of District Board 8 (Southern No. 2), under the Bituminous Coal Act. Mr. Gandy, formerly executive secretary of the National Coal Association, has been resting in Wyoming.

W. E. HALL has been appointed division superintendent of the Preston division (Morgantown, W. Va., field) by the Industrial Collieries Corporation, with headquarters at Dellslow, W. Va. C. M. HOARD has been named superintendent of No. 41 mine, Barrackville, W. Va. K. W. BARTLETT has been made superintendent at No. 42 mine, Dakota, W. Va. N. A. EMSLIE will continue as division superintendent of the Marion division, consisting of the Barrackville and Dakota (W. Va.) properties.

W. H. HUDDY has been appointed general superintendent of the Detroit Mining Co., Gordon, Boone County, W. Va. He had been superintendent of the Walhounding mine of the Cambridge Collieries Co., Ohio, until that company went out of business.

T. R. JOHNS, who has been general manager of the Industrial Collieries Corporation for a number of years, has been named vice-president of the corporation as of Nov. 1. This is the coal-producing subsidiary of the Bethlehem Steel Corporation, and the promotion was announced following a meeting of the parent company's directors on Oct. 29. Mr. Johns will continue in the capacity of general manager.

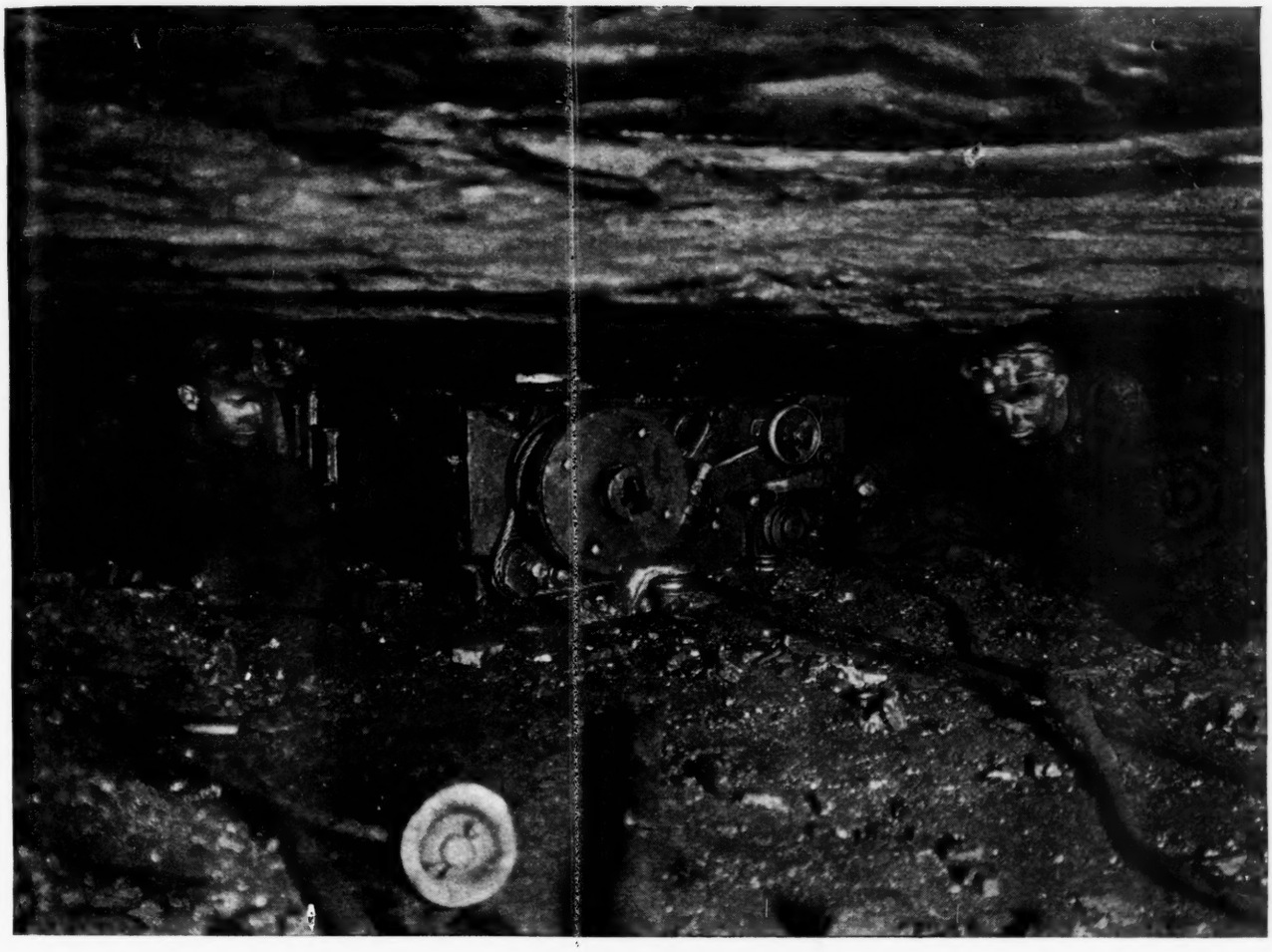
CLARENCE LEE, formerly loader engineer at the Tiger operations of the Hume-Sinclair Coal Mining Co., Hume, Mo., has been made superintendent of the company's new Marigold mine, Jasper, Ala.

J. S. LEEDY, chief engineer for the Ashland Coal & Coke Co., Ashland, W. Va., where he has been for the last fourteen years, has been promoted to superintendent, vice F. E. Powers, transferred.

FRED S. MCCONNELL, heretofore vice-president in charge of operations and general manager of the Enos Coal Mining Co., with offices at Cleveland, Ohio, and operations at Oakland City, Ind., has been elected president of the company, vice George A. Enos, deceased. Other officers named are: ARTHUR W. DEAN, executive vice-president and treasurer; ORTHO L. SCALES, vice-president in charge of sales; WILLIAM H. NICHOLS, vice-president in charge of operations; CHARLES R. BARNARD, chief engineer; W. T. ALLEN, pit superintendent; L. W. KING, master mechanic; H. P. NICHOLS, tipple superintendent; G. H. UTTERBACK, production engineer; R. L. ALPINE, chief electrician; JESSE HUGHES, safety engineer; W. R. CALER, preparation manager.

D. HOLMES MORTON, president, Winifrede Collieries, was reelected president of the Kanawha Operators' Association at its annual meeting. Directors named were: F. L. HORNICKEL, president, Anchor Coal Co.; A. W. POLLOCK, vice-president, Spruce River Coal Co.; JOHN LAING, president, Wyatt Coal Co.; C. A. CABELL, president, Carbon Fuel Co.; W. H. PETTUS, president, Colcord Coal Co.; W. W. MILLER, general manager, Hatfield-Campbell Creek Coal Co.; A. S. WILSON, general manager, Boone County Coal Corporation; GARNER WILLIAMS, vice-president, Truax-Traer Coal Co., and F. C. HARRIS, vice-president, Hamilton Coal & Coke Co.

J. E. NORTON was appointed assistant to the president of the Pittsburgh Coal Co., effective Nov. 1, according to an announcement by J. B. Morrow, president of the



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HEN a workman is lying on his side under a 3-ft. ceiling, a cranky, spiny rope can badly hamper him. A sharp bristle may cut his hands. Or he may have to fight the rope for minutes at a time to get it working properly.

Here's how Bethlehem Formset Wire Rope makes this job easier:

Formset is relaxed, easy to thread through sheaves or to ease around corners. Formset spools better. Cut ends need not be "seized." And if an outside wire should be severed by abrasion, it won't wicker out and cut workmen's hands.

The reason for Formset's ease of handling lies in its construction. Before Formset rope is run through the closing machine, each strand is preformed into the exact shape it will occupy in the finished rope. There are no "locked-up tensions." If Formset rope were to be taken apart, the strands and the wires would resemble elongated corkscrews, and could be fitted back into the same slots they emerged from.

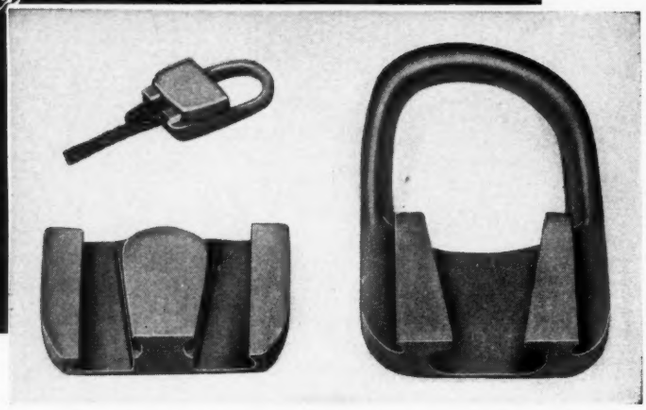
Bethlehem Formset Wire Rope is obtainable in all standard grades of steel, in a complete size range, and in right or left regular lay rope, or Lang lay rope.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

JIM SLIM says:

"HERE'S ONE OF MY PARTNERS IN COAL MINING COST REDUCTION SERVICE



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Providing new efficiency through revolutionary design to a product used all over every coal mining operation . . . that's the BOWDIL ROPE SOCKET. Simple yet efficient, this "dead-eye" embodies numerous features that stamp it as a quality product. Light in weight, yet stronger than ordinary rope sockets, the eye is offset to give a straight pull. You can put one on a cable in two minutes, without tools. The cap and socket design means you can remove broken ropes without punches—just knock off the cap. It's safe, too . . . the BOWDIL ROPE SOCKET construction tends to eliminate sharp wire rope jaggers. Let us tell you more about this efficiency building partner of JIM SLIM'S. A letter to the BOWDIL CO., CANTON, OHIO, will bring complete details.

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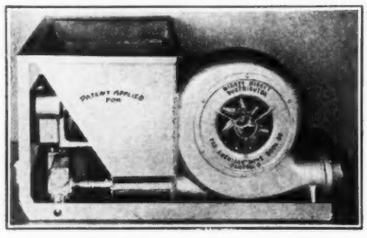

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It does a WHALE of a job. Distributes more than a ton of dust per hour. 34 lbs. a minute. Cost is small. Trade in value large if you want a larger machine later. We will demonstrate machine at your mine. Tell us when.

CANTON AUTOMATIC MINE DOORS

Direct the air in your mine. Improves Ventilation. VELOCITY is maintained to sweep out noxious gases and protect the mine from EXPLOSIONS.

NO TRAPPER REQUIRED — POSITIVE IN ACTION — SURE TO OPEN — NEVER FAILS TO CLOSE

THOUSANDS

in successful use REQUIRE MINIMUM ATTENTION. MAY BE LEASED OR BOUGHT.

THE AMERICAN MINE DOOR COMPANY

2057 Deuber Ave., Canton, Ohio

company. Mr. Norton was graduated from Dartmouth College in 1928 and for ten years was connected with the coal company's preparation department, after which he served one year as production scheduler and one year as assistant industrial relations manager.

M. F. PELTIER, vice-president in charge of operations, Peabody Coal Co., was re-elected president of the Illinois Coal Operators' Association at its twelfth annual meeting. Also renamed were FRED S. WILKEY, secretary, and THURLOW G. ESSINGTON, general counsel. Named to the executive committee were: D. W. BUCHANAN, president, Old Ben Coal Corporation; H. E. HOWARD, president, Binkley Mining Co.; T. C. MULLINS, president, Tecumseh Coal Co.; L. D. SMITH, vice-president in charge of operations, Chicago, Wilmington & Franklin Coal Co.; T. J. THOMAS, president, Valier Coal Co.; W. P. YOUNG, vice-president in charge of operations, Bell & Zoller Coal & Mining Co., and Mr. Peltier.

DR. C. J. POTTER has resigned as assistant chief of the marketing division, Bituminous Coal Division, Department of the Interior, to become associated with the Rochester & Pittsburgh Coal Co., Indiana, Pa. He has been succeeded in the Bituminous Division by MAX MILLIGAN, who has been with the division for some time.

F. E. POWERS, superintendent, Ashland Coal & Coke Co., Ashland, W. Va., has been transferred to Affinity, W. Va., as superintendent of the Pemberton Coal & Coke Co. He has been superintendent at Ashland for the last twelve years.

EDWARD J. QUINN, postmaster at Wilkes-Barre, Pa., and three times elected president of the Wilkes-Barre-Wyoming Valley Chamber of Commerce, resigned from the latter post on Oct. 28. Having taken over operation of the Sindaco Coal Co., Hilldale, Pa., recently he found it necessary to relinquish the Chamber of Commerce presidency for lack of time to devote to the duties of the office.

WILLIAM B. RAMSDALE has been named to the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he is to make an investigation of ignition temperatures of various coals and cokes. He is a graduate of Southwestern College and Syracuse University.

JOHN J. SNURE, formerly superintendent of Ernest mine, has been appointed division superintendent over Waterman, Lucerne Nos. 2 and 3 and Ernest mines of the Rochester & Pittsburgh Coal Co., Indiana County, Pennsylvania, effective Nov. 1.

GRANT STAUFFER, president of the Sinclair Coal Co., Kansas City, Mo., has been elected a director of the American Mining Congress.

J. L. THOMPSON, formerly mine foreman at the Gates mine of the Crystal Block Mining Co., Lobata, W. Va., has been appointed superintendent of No. 5 mine of the Crystal Block Coal & Coke Co., Roth, W. Va.

F. D. WELSH, superintendent of the Ros-

siter operation of the Clearfield Bituminous Coal Corporation, has also assumed the superintendency of the company's Commodore mine, Commodore, Pa. In the latter capacity he succeeds Fred E. Bass, deceased.

•

Stoker Men Perfect Campaign To Level Sales Curve

A decision to combine the best technical and merchandising talent in its membership in a solidified effort to establish a sound and effective cooperative sales promotional and advertising campaign in the new-home-building field was reached at the 1940 fall meeting of the Stoker Manufacturers' Association, held Nov. 15 at the Stevens Hotel, Chicago. This, together with announcements of a concerted drive by individual members to put into effect practical and effective winter sales plans for leveling out the stoker sales curve, constituted the major considerations and discussions at the conference.

The association's advertising and public relations committee was instructed to prepare a definite program of advertising for submission to the membership of the association at a special meeting to be held about the middle of January in Chicago.

The engineering and research committee reported after a meeting that an agreement had been reached in the establishment of tentative data on standard recommendations governing boiler-base heights and grate dimensions. This will be submitted to the stoker industry for acceptance and then be prepared for submission to the manufacturers of boilers as the official recommendation of the stoker manufacturers for base heights and grate dimensions for boilers built for stoker firing.

Harold J. Spear, assistant sales manager, Koppers Coal Co., and Walter Knox, research engineer for the same company, spoke briefly concerning the research work on stokers and stoker coals being conducted by that company at its Kearny (N. J.) research laboratory. Then the new color film portraying some of the results of Koppers research work was shown to the group.

•

Enforcement of Mine Safety Law Ordered by Illinois Governor

Vigorous enforcement of the State mining law "without fear or favor" was ordered by Governor John Stelle of Illinois in a letter to James McSherry, State Director of Mines and Minerals, on Oct. 31. The executive's missive was the result of a request by Ray Edmundson, State president, United Mine Workers, that all mines in the State be declared "gaseous" in order to outlaw the practice of shooting while miners are in the mine. The letter said, in part:

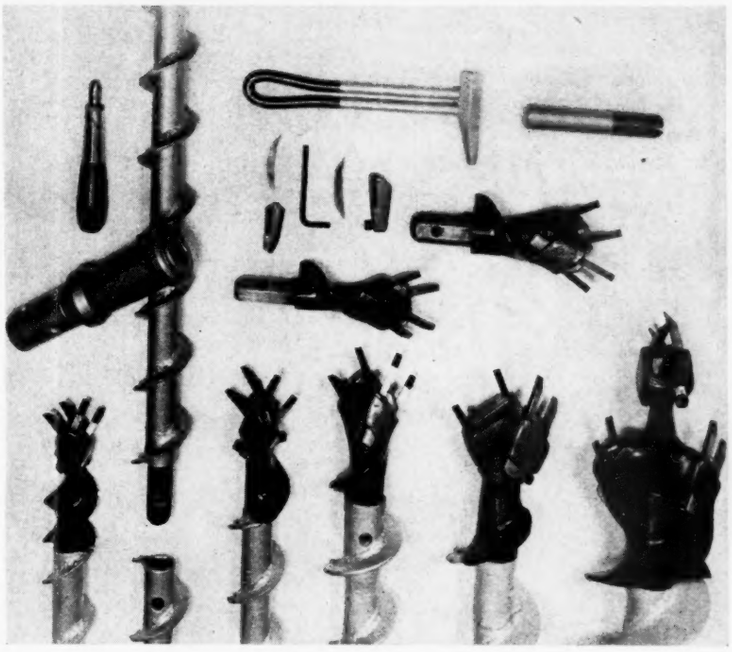
"My attention has been called to the fact that certain practices in the mining of coal may be endangering the safety of miners. Under the law, every coal mine is presumed to be dangerous. The lives of all men working in mines are always in some danger because of the hazardous nature of the occu-

Important! **The Coalmaster bit positioning plan breaks up the coal instead of pulverizing it. This breaking action *works faster, takes less power, and eliminates coring.* A valuable by-product is, that a larger portion of the fines are salable.**

COALMASTER **STAGGERED TOOTH TOOLS**

for

Post and Machine Mounted Drills



Here is part of a line of tools made in sizes to drill correct holes for all powder, Cardox, Airdox, Hydraulic, and special requirements.

These tool designs, you will notice, are all based upon a *staggered* (patented) bit positioning plan evolved from extensive research and development carried on in many seams and in many states.

COALMASTER light-weight, hollow, alloy augers are easier to handle. They run true and they clean the holes clean without scraping. The non-choking Hexanspeed auger coupling (patented) eliminates the heavy 9-foot auger from a post drill set-up.

We welcome the opportunity to equip one of your drills for a 15-day free trial.

In use across the country—

U. S. Fuel Co.	Utah
Rock Springs Fuel Co.	Wyo.
Montana Coal & Iron Co.,	Mont.
Rocky Mountain Fuel Co.,	Colo.
Peabody Coal Co.,	Ill.
Standard Coal Co.,	Ind.
Hanna Coal Co.,	Ohio
Elkhorn Coal Co.,	Ky.
Buckeye Coal Co.,	Pa.
Island Creek Coal Co.,	W. Va.

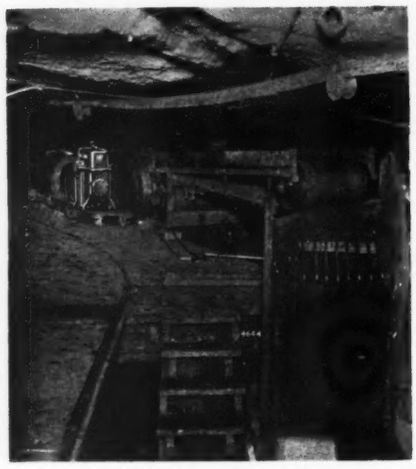
CENTRAL MINE EQUIPMENT CO.,
4520 Enright Ave.,
St. Louis, Mo.

Send us your folder on COALMASTER Tools for Blast Hole Drilling

Name ..... Title.....

Company .....

Location .....



De Laval worm gear driving Jeffrey coal conveyor at mine of Pennsylvania Anthracite Colliery Co.

KEEP *MECHANICAL EQUIPMENT* WORKING

No other form of speed reducer is so simple or so nearly foolproof as

DE LAVAL WORM GEARS

A single reduction gear, has only two working parts and four bearings. Lubrication is automatic from a reservoir which needs only occasional inspection. No other attention is required.

The smooth, shockless flow of power prolongs the life of the gears, bearings and other parts in connected machinery.

Ask for Bulletin W-1110 on "Worm Gear Drives"

De Laval Worm Gears combine nearly 40 years of experience in the application and manufacture of high speed power transmitting machinery with the use of superior heat-treated materials and production by improved precision equipment and methods.

DE LAVAL
WORM GEAR DIVISION
of the
De Laval Steam Turbine Co.
Trenton, New Jersey

pation. Under the law, daily inspection is made to determine certain dangers.

"If danger is found to be present it is the duty of your department to enforce the law, so that the lives of the men shall be protected. It is generally agreed that the mining laws are inadequate and all parties have agreed to hold a conference to improve the law so that the lives of miners will be given the utmost protection.

"I am insisting that your department vigorously enforce the law without fear or favor. I expect your department to make rigorous inspection at all times because the first consideration of the law is the safety of the men engaged in mining. I expect your department to prosecute vigorously any infractions of the law."

•

Natural Resources Building Dedicated by Illinois

The ten-year dream of Dr. M. M. Leighton, chief of the Geological Survey of Illinois, has come true. On Nov. 15, that State dedicated its magnificently equipped Natural Resources Building, on the University of Illinois campus, at Urbana, with Dr. Leighton, its untiring sponsor, the central figure in a three-day celebration of the event. The birth of the dream took place on Oct. 31, 1930, when Dr. Leighton presented to the Illinois Mining Institute a seven-point program of the State Geological Survey urging that a State industries building be provided "which shall be adequate, suitable and appropriate as a headquarters of research and as a source of information regarding resources and utilization."

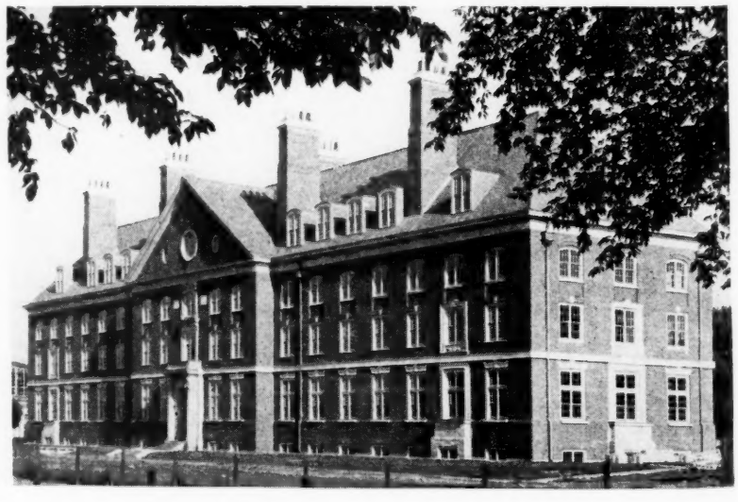
At that meeting the institute passed a resolution urging the Geological Survey and the University of Illinois to provide equipment and personnel as a "means of rehabilitating the coal industry" and to aid in developing the mineral resources of the State. By 1933, temporary quarters had been in use for two years. The institute then appointed a committee of three to seek Federal aid for permanent quarters. In 1937 the State of Illinois appropriated $300,000, to which $245,454 of Federal funds were added, making possible the permanent fine building now in service.

The 1939-40 smoke fogs in St. Louis, and consequent anti-smoke ordinances, so jeopardized the Illinois coal industry as to persuade its Legislature to appropriate a further sum of $180,000 for promotion of means of smokeless burning of Illinois coal. This has resulted in the erection of the Geological Survey Laboratory, also on the University of Illinois campus. Its function is the demonstration of smokeless combustion of commercial coals, the possibility of making briquets without a binder and such other demonstrations as may be desired in the future. The latter building, though not entirely completed, is in service. A continuous briquetting machine is on the floor and is soon to be under operating test. The high point in the process sought to be perfected is that no binder is to be used; only heat pressure.

The dedicatory address was by Dr. Isaiah Bowman, president, Johns Hopkins University, who reiterated the Pilgrim theme "Our Better Ordering and Preservation." He emphasized that "the Pilgrim code of working together as a body for the protection and improvement of all has enjoyed continuous recognition in America. . . . It is vital to our system of living and it is especially applicable today, when we try to see the present meaning of wise and continuing use of our natural resources, which is the true purpose of conservation."

At the first coal session of the Mineral Industries Conference, under the chairmanship of M. F. Peltier, vice-president, Peabody Coal Co., and Glenn A. Shafer, president, Pana Coal Co., the following papers were presented: "Public Control of the Coal Industry," C. J. Potter, manager of preparation, Rochester & Pittsburgh Coal Co.; "Coal Marketing Agencies," R. E. Howe, president, Appalachian Coals, Inc.; "The Railroad's Participation in the Marketing of Illinois Coal," C. N. Lammers, fuel service engineer, Chicago & Eastern Illinois Ry. Co.; "Water-Borne Traffic in Illinois Coal," Rufus W. Putnam, president, Maritime Engineering Corporation.

At the second session, presided over by Roy Adams, general superintendent, Old Ben Coal Corporation, and William R. Chedsey, dean, Missouri School of Mines, these papers were read: "Coal Research Program of the Illinois Geological Survey,"



New Illinois Natural Resources Building, Urbana

M. M. Leighton, chief; "Some New Information on Coal in the Field of Physics," R. J. Piersol, physicist, Illinois Geological Survey; "New Information on Coal in the Field of Chemistry," O. W. Rees (chemist), G. R. Yohe (associate chemist) and F. H. Reed (chief chemist), Illinois Geological Survey; "Recent Researches in Home Heating by the Illinois Engineering Experiment Station." A. P. Kratz, research professor of mechanical engineering, University of Illinois; "Visual Record of Combustion in a Domestic Stoker, and Discussion of a New Method of Predicting the Combustion Behavior of a Coal," L. C. McCabe, geologist, Illinois Geological Survey; S. Konzo, special research assistant professor of mechanical engineering, University of Illinois; and O. W. Rees, chemist, Illinois Geological Survey.

•

New Preparation Facilities

Bird Coal Co., Tire Hill, Pa.: Contract closed with Roberts & Schaefer Co. for complete crusher and loading-boom installation for reducing lump coal to 1¼-in. slack; capacity, 250 tons per hour.

Chicago, Wilmington & Franklin Coal Co., Orient No. 1 Mine, Orient, Ill.: Contract closed with Roberts & Schaefer Co. for Stump Air-Flow cleaning equipment to treat 0x7/16-in. raw coal at a feed rate of 175 t.p.h. Stump units are 1940 design with adjustable air control, multiple refuse and middlings draw-offs; plant completed.

Clinchfield Coal Corporation, No. 9 Mine, Clinchco, Va.: Contract closed with Fairmont Machinery Co. for one set of shaker screens to handle 360 t.p.h. of mine-run coal, designed to make three products simultaneously; to replace existing equipment.

Delta Coal Mining Co., Delta Siding, Ill.: Contract closed with McNally-Pittsburg Mfg. Corporation for washery addition to existing plant incorporating McNally-Norton automatic washer to treat 300 t.p.h. of 6x3-in. coal, including new washed-coal classifying screen and other revisions; to be completed about Jan. 1.

Heidelberg Coal Co., Heidelberg Colliery, Avoca, Pa.: Contract closed with Finch Mfg. Co. for one 3-ft. Menzies cone separator to clean No. 4 buckwheat coal; feed capacity, 12 tons per hour.

Heisley Coal Co., Nanty Glo, Pa.: Contract closed with Roberts & Schaefer Co. for crusher installation for reducing lump and egg coal to 1¼-in. slack; capacity, 125 t.p.h.; plant completed.

Hudson Coal Co., Pine Ridge Colliery, Scranton, Pa.: Contract closed with Wilmot Engineering Co. for one 7-ft. Hydrotator, also one 16-ft. Hydrotator classifier complete with standard feed sizing shakers and Selectro vibrating screens to dewater and size Nos. 4 and 5 buckwheat; capacity, 50 tons per hour; addition to existing facilities: to be completed within 30 days.

Jermyn & Green Coal Co., No. 14 Colliery, Pittston, Pa.: Contract closed with Finch Mfg. Co. for one 4-ft. Menzies cone

"INSTALLED IN 1932, This STERLING Turbine Pump IN PERFECT CONDITION TODAY!"
Read This Excerpt From A Letter of J. L. Biddle, Supt. of Maintenance, WESTVACO CHLORINE PRODUCTS, INC.
"We installed the first Sterling Turbine Pump in 1932 at 500′ setting. This pump has been in continuous service since that date except when we pulled the well to inspect the pump and lower pump to 700′ setting. On May 26, this year (1936), we again pulled this pump to inspect it, and again found it to be in perfect shape.
"Since 1932 we have installed many more of the same type of Sterling pumps . . . we are 100% sold on them!"
Such a statement by a man of authority who has no personal axe to grind should mean much to you who have coal mine dewatering problems. Write for full details, catalogs and prices—today.

Few Sterling Pump owners need service—but if you need it, Sterling offers the highest class of service from coast to coast.

OSMOSE-TREATED TIES & TIMBERS LAST AT LEAST 3 to 5 TIMES LONGER!

Untreated timbers failing in large Alabama coal mine after only 2 years' service.

Osmose-treated timbers, installed by same operator will last many times longer.

OSMOSE NATURAL PRESSURE TREATMENT

Assures Permanent Wood Structures at Lowest Cost

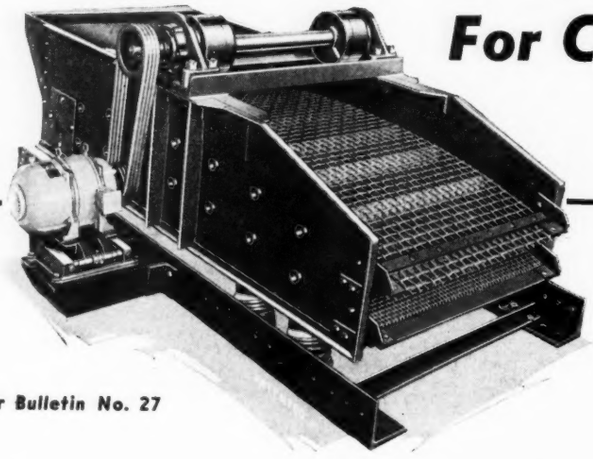
Wherever you use ties, bridges, buildings, roof supports, etc., you can secure permanence at lowest cost by using Osmose-treated wood. Osmose Natural Pressure Treatment increases service life of wood at least 3 to 5 times; requires no heat or pressure treating equipment, yet secures deep and effective penetration of proved wood preservatives at a fraction of the cost of comparable treating methods. Treatment is as simple as A-B-C; you can apply it yourself, or buy wood ready-treated. Write for literature.

OSMOSE WOOD PRESERVING CO. of America, Inc.

General Offices:
BUFFALO, N. Y.

Branch Offices:
Birmingham, Ala.—Denver, Colo.
Harlan, Ky.—Mt. Vernon, Ill.

Deister Plat-O Vibrating Screens *For Coal*



Write for Bulletin No. 27

1. Sizing Run-o-Mine.
2. Rescreening in Preparation Plants.
3. Dewatering either coarse or fine coal.
4. Preparation of Stoker Coal.

DEISTER MACHINE COMPANY

1933 E. WAYNE STREET (INCORPORATED 1912) FORT WAYNE, INDIANA

Cable Address "Deister"

EMIL DEISTER, SR., Pres. • I. F. DEISTER, V.Pres. • EMIL DEISTER, JR., Secy.-Treas.

Manufacturers of PLAT-O Coal Washing Tables, PLAT-O Ore Concentrating Tables, Heavy Duty PLAT-O Vibrating Screens, Deister Compound Funnel Classifiers.

separator to clean barley coal; feed capacity, 22 tons per hour.

LINDSEY COAL MINING CO., No. 8 Mine, Punxsutawney, Pa.: Contract closed with Roberts & Schaefer Co. for Stump Air-Flow coal-cleaning equipment to clean 0x¾-in. raw coal at a feed rate of 45 tons per hour; to be completed Dec. 1.

MONROE COAL MINING CO., Revloc, Pa.: Contract closed with Roberts & Schaefer Co. for crusher installation to reduce lump and egg coal to 1¼-in. slack; capacity, 125 t.p.h.; plant completed.

PAGE COAL & COKE CO., Pageton, W. Va.: Contract closed with Roberts & Schaefer Co. for hydro-separator coal-washing plant and revisions to existing tipple; capacity, 700 tons per hour of mine-run; washing facilities for 6x1¼-in. raw coal; picking of lump and screening into lump, 6x3-in. egg, 3x1¼-in. stove, 1¼x⅝-in. nut, ⅝x¼-in. pea, and 0x¼-in. slack; to be completed Jan. 1.

POMPEY COAL CO., Pompey Breaker, Jessup, Pa.: Contract closed with Finch Mfg. Co. for one 3-ft. Menzies cone separator to clean rice coal; feed capacity, 12 tons per hour.

RED LANDS COAL CO., No. 9 Mine, Glenside, Pa.: Contract closed with Roberts & Schaefer Co. for complete tipple and hydro-separator coal-washing plant; capacity, 150 t.p.h. mine-run, with crushing and washing facilities to produce 3x1¼-in. egg, 1¼x⅝-in. stoker and 0x⅝-in. slack; plant completed.

RED LANDS COAL CO., No. 11 Mine, Sides, Pa.: Contract closed with Roberts & Schaefer Co. for complete tipple and hydro-separator coal-washing plant; capacity, 150 t.p.h. mine-run, with crushing and washing facilities to produce 3x1¼-in. egg, 1¼x⅝-in. stoker and 0x⅝-in. slack; plant completed.

ROSLYN-CASCADE COAL CO., Ronald, Wash.: Contract closed with Roberts & Schaefer Co. for Stump Air-Flow coal-cleaning equipment to clean 0x¾-in. coal at feed rate of 15 tons per hour; to be completed Dec. 1.

SULLIVAN TRAIL COAL CO., Sullivan Trail Breaker, West Pittston, Pa.: Contract closed with Finch Mfg. Co. for one 4-ft. Menzies cone separator to clean rice coal; feed capacity, 22 tons per hour.

SYCAMORE COAL CO., Cinderella, W. Va.: Contract closed with Roberts & Schaefer Co. for complete hydro-separator coal-washing equipment to treat 0x3-in. coal at rate of 125 tons per hour, provision being made to load 3x1-in. 1x⅝-in. and ⅝-in.x0 coals; to be completed Dec. 15.

•

A.I.M.E. Names Oil Man As New President

John Robert Suman, Houston, Texas, has been elected president of the American Institute of Mining and Metallurgical Engineers. Mr. Suman is vice-president of the Humble Oil & Refining Co., principal producing subsidiary of the Standard Oil Co. of New Jersey. Election was by letter ballot, the report of tellers being made at a meeting

38% OF ALL POMONA PUMPS ARE BOUGHT BY PRESENT USERS

Every third Pomona-made pump joins another Pomona installation in some important Industrial, Transportation, Agricultural, Mining or Municipal water-lifting job. This conclusive expression of owner satisfaction has made Pomona the dominant leader in the deep-well turbine field. Such superiority merits investigation. Pomona Pump Co., 120 Broadway, New York City. Plants at 4301 So. Spring Ave., St. Louis, Mo. 206 E. Commercial St., Pomona, Calif.

Established 1902

POMONA *Water Lubricated* PUMPS

An advertisement reprinted from a current issue of FORTUNE

of the board of directors on Nov. 19 at the Engineering Societies Building, New York City.

Also elected were: vice-presidents—Paul D. Merica, vice-president, International Nickel Co. of Canada, Ltd.; LeRoy Salsich, president, Oliver Iron Mining Co. Four new directors also elected are: J. Terry Duce, vice-president, California Arabian Standard Oil Co.; Ira B. Joralemon, president, Desert Silver, Inc.; J. R. Van Pelt Jr., assistant director, Museum of Science and Industry, Chicago; and Clyde E. Williams, director, Battelle Memorial Institute. Reelected as directors are: H. T. Hamilton, assistant to the president, New York Trust Co., and H. Y. Walker, vice-president, American Smelting & Refining Co.

•

Track vs. Trackless Mining Takes Spotlight At Illinois Mining Institute Meeting

TRACKLESS or semi-trackless transportation from the face versus the more conventional haulage methods in mechanical mining set-ups claimed the lion's share of the program of the fall meeting of the Illinois Mining Institute at Hotel Abraham Lincoln, Springfield, Ill., Oct. 25. Advocates of the newer systems stressed flexibility and speed; proponents of track emphasized the ability of steel to carry great weight, making, they contended, sacrifice of ruggedness and high capacity to lightness and mobility unnecessary.

How important effective ventilation is from the standpoint of safe operation, elimination of fatigue, ability to meet emergencies, and costs was the theme of another address. Establishment of vocational education for Illinois miners was stressed in an interim report of the institute committee on that subject. John E. Jones, safety engineer, Old Ben Coal Corporation, speaking for the committee on roof control, said that the U. S. Bureau of Mines would not be able to give active attention to roof problems at the present time because of demands on its personnel in connection with the national-defense program.

Many Advantages Listed

Detailing the experiences with shuttle-car operation at the Harco No. 47 mine of Peabody Coal Co. (see *Coal Age*, October, 1940, pp. 76, 88), B. F. Burnett, superintendent, declared that this system had many advantages over older methods. With shuttle cars, there are practically no delays due to broken caterpillar chains, derailments or locomotives. Cutting-machine men and drillers are not blocked off by cars standing on track. Loading machines can be moved more quickly from place to place because they meet no obstructions in going through crosscuts close to the working faces. Short cuts are made more easily when there is no track to consider.

The loading elevator, continued Mr. Burnett, usually can be so placed that hills, if any, favor the loads. Increased tonnage helps reduce haulage and loading-machine maintenance costs. Loss of materials, such as tracks and ties, is eliminated. Rock falls can be loaded into the shuttle cars and unloaded into rooms not used for haulage. Mine-car service is less severe. Rooms can be driven greater distances by keeping the elevator advanced and decreasing the number of entries to be driven. Finally, low coal which could not otherwise be worked without reducing car height, with consequent loss in tonnage, can be recovered economically with the shuttle-car set-up.

Because seam thickness in part of the Harco mine is only 51 in., explained Mr. Burnett, it was decided to try recovery with 14-BU Joy loaders and shuttle cars. The mining system calls for blocks of sixteen rooms. Room necks are 14 to 16 ft. wide; rooms are on 50-ft. centers, are 300 ft. deep and 28 to 30 ft. wide. The elevator is placed as near as possible to the center of a block to equalize the haulage from working places to the elevator.

A shallow hole was made in the bottom on one side of the loading elevator and the elevator hopper was placed in it so the top of the hopper would be level with the floor for easy unloading of the shuttle cars. Roof in front of the crosscut on the opposite side was shot down so that the other end of the elevator could be raised over the mine cars for fast and full loading. Rooms outby the elevator had the inby corners slabbed off; rooms inby had the outby corners slabbed off, giving the shuttle cars ample clearance traveling in and out of rooms.

Two locomotives service a shuttle-car unit. The haulage road for these locomotives is on an entry opposite the working-room entry. This entry was widened so two tracks could be laid; one of these is a passing track. One locomotive can deliver loads to the parting, take empties and, by using the passing track, be ready to serve the elevator when the second locomotive pulls its loads. Mine cars are 40 in. from top of rail to top of cars. The haulage entry and all main-haulage roads are brushed. Brushing starts at the entry mouth and extends for a distance beyond the elevator, "permitting us to load a much larger car of coal." Three single and 47 double shifts in 50 days of mine operation work out a block of rooms.

Roy L. Adams
Retiring President, Illinois Mining Institute

R. L. Ireland, Jr.
Addresses annual Illinois Institute dinner

Trackless mining, declared A. S. Knoizen, vice-president, Joy Manufacturing Co., in presenting a colored motion picture of shuttle-car operations in several mines, can be justified only on a cost-saving basis. That this justification existed was indicated by the fact that 250 shuttle-car units are now in operation. These units are working in seams ranging from 32 in. to 14 ft. Car capacity, dependent upon seam height, runs from 3 to 12½ tons. Cost savings, he said, range from 14 to 33c. per ton.

Costs Final Determinant

Opening the case for track mining, J. B. Haskell, sales manager, rail and trackwork division, West Virginia Rail Co., agreed that the respective comparative costs of the two systems must be the final determinant. These costs, however, should include every factor properly chargeable to them so that the final comparisons may be true ones. Poor trackwork and the costs inherent in such work may not fairly be compared with costs for trackless mining where every provision has been made to effect operating economies. Whether track is a liability or an asset depends upon the character of the installation and how well it is maintained.

Greater weight, he said, can be moved over steel rail than in any other way. This means that weight need not be sacrificed to mobility and that heavier equipment with longer life and lower maintenance costs may be used. The best returns are not necessarily achieved by the lowest initial investment. Time in both cutting and loading as well as in actual transportation must be considered in arriving at comparative costs. Layout also is influential in determining economy of movement. There must be a planned program of design, installation and maintenance to effect the greatest savings.

While tracks in rooms and entries generally are the most troublesome, the biggest opportunities for improvement lie in such tracks, Mr. Haskell asserted. Reduction in material costs may be won by proper selection of material. Prefabricated trunouts, for

SUPERLA GREASE *"STANDS UP UNDER EXTREMELY PUNISHING CONDITIONS"*

The Superintendent of an Indiana strip mine tried many greases on the bearings in the hoists pictured. Here's what he found out:

"After many unhappy experiences with oils and greases manufactured by various companies, we tried Standard Oil Superla 4-X Grease on some of our large bearings operating under extremely heavy loads, high pressures and reverse motion . . .

"After six months we are thoroughly convinced that Superla 4-X Grease more than meets the demand placed upon it.

"We appreciate the advice and counsel given us by the Standard Oil Company Lubrication Engineers."

SUPERLA MINE LOADER GREASE

"REDUCES TEMPERATURES AND CONSUMPTION"

A shaft mine superintendent also had grease trouble. Here's what he reports:

"We have conducted several experiments with various greases for the lubrication of our loaders.

"Standard Oil Company Lubrication Engineers assisted our personnel in conducting tests under actual operating conditions in the mine to determine temperatures and consumption.

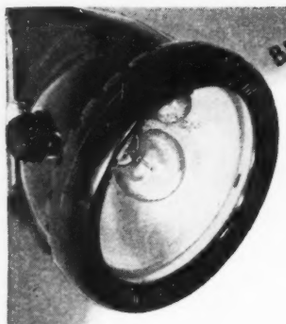
"We have now used Superla Mine Loader Grease for one year and find this lubricant to be entirely satisfactory. We are not only able to operate at lower temperatures but also with a materially reduced consumption."

A SPECIAL LUBRICATION SERVICE FOR MINES

What could give more convincing proof that Standard Oil mine-lubricants can end your hunt for low cost lubrication, than a test of these products in your own equipment. Standard Oil Engineers are available for making these tests for all operators in the Middle West. Call the local Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois for the engineer nearest you. Tell him your problem. He'll do the rest.

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING *THE RIGHT LUBRICANT • PROPERLY APPLIED TO REDUCE COSTS*



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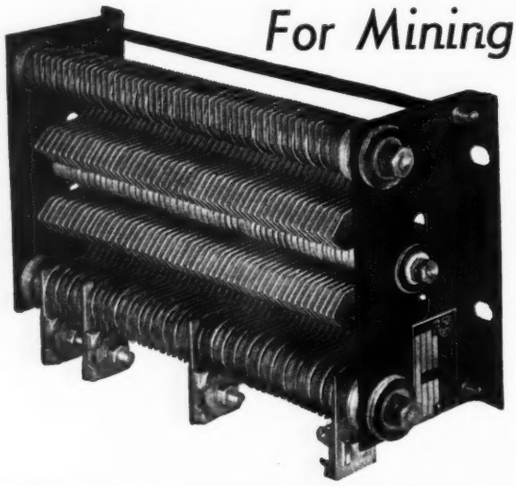

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example, cut labor costs on trackwork from 25 to 50 per cent. Good trackwork also may reduce the number of turnouts required. Use of larger cars opens the door to lowering transportation costs.

Although the major part of his paper was devoted to over-all aspects of mechanical mining (see p. 53), E. H. Johnson, manager, loading-machine division, Jeffrey Mfg. Co., also was a defender of track mining. "Excepting conveyors," he said, "most of our portable equipment moves and operates on steel rails" and illustrates "our conviction that the cost of a steel highway from face to sidetrack is justified by its value except when its use requires expensive brushing of roof or floor." A recent inquiry on cost of section trackage in mines using loading machines, with returns from 40 mines in eight States, showed an average labor and material cost of 8.46c. per ton. The highest and lowest costs reported—both from the same State in the same seam under very similar conditions—were 12.5 and 4.75c., respectively.

"A sufficient volume of air flowing at the necessary velocity to properly control dust and dilute and carry away all emissions of gas," stated Charles Pullen, safety manager, Chicago, Wilmington & Franklin Coal Co., is of prime importance. Too little attention, he added, has given to the possibilities of minimizing the ill effects of high temperatures and humidities and to the general foulness of air due to decaying organic matter and emanations from the lungs and bodies of men and animals. Such air takes its toll in fatigue and lowered efficiency of the worker.

Crosscuts, he continued, should be driven at the right locations, wide enough to handle the ventilating current, and kept clean and

Illinois Institute Officers

M. M. Leighton, chief, Illinois State Geological Survey, was elected to succeed Roy L. Adams, general superintendent, Old Ben Coal Corporation, as president of the Illinois Mining Institute at its fall meeting in Springfield, Oct. 25. J. A. Jefferis, Illinois Terminal R.R. System, St. Louis, Mo., was made vice-president, and B. E. Schonthal, Chicago, was again the choice for secretary-treasurer. New executive board members are: Howard Lewis, assistant general superintendent, Old Ben Coal Corporation; Byron Somers, superintendent, St. David mine, Truax-Traer Coal Co.; C. W. Woosley, general superintendent, Pyramid Coal Corporation. Other members of the board are: J. G. Crawford, general manager, Valier Coal Co.; D. H. Devonald, assistant to the vice-president, Peabody Coal Co.; G. S. Jenkins, assistant general manager, Consolidated Coal Co.; Fred Miller, assistant vice-president, Franklin County Coal Corporation; M. M. Moser, vice-president, United Electric Coal Cos.; L. D. Smith, vice-president, Chicago, Wilmington & Franklin Coal Co.; L. A. Wasson, general superintendent, Wasson Coal Co.; D. D. Wilcox, general superintendent, Superior Coal Co.; W. P. Young, vice-president, Bell & Zoller Coal & Mining Co.

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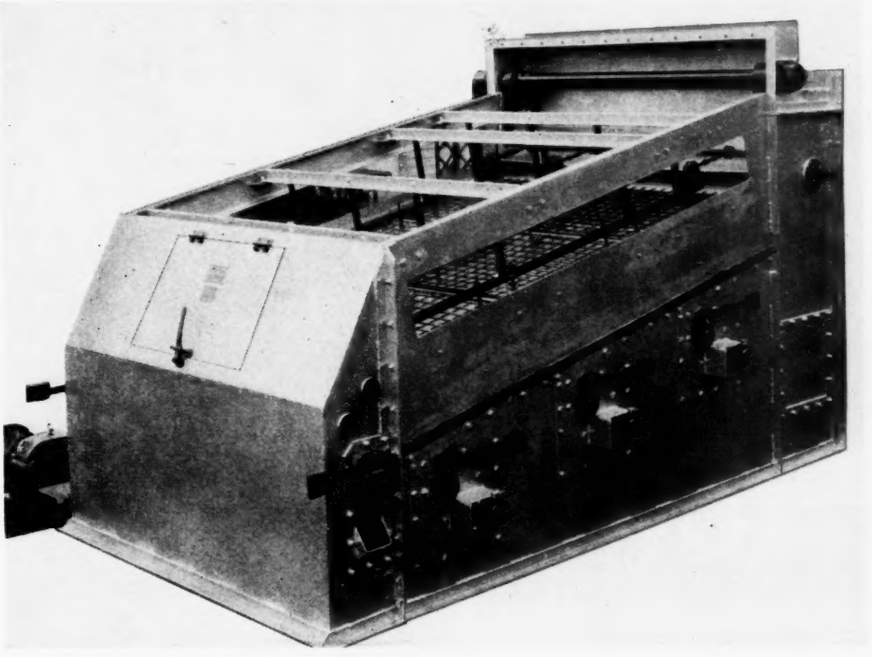

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Whatever your preparation needs may be our engineers can find the answer.

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COAL DRYERS

DEDUSTING PLANTS

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REVOLVING DUMPS

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R&S has, during the past 38 years, through contact with the industry, developed better methods of coal preparation with least cost to the operator — made possible maximum efficiency and recovery — and has produced better systems for preparing coal for today's highly competitive market. Whether you desire a better competitive position by replacement of obsolete equipment, or wish to insure the efficiency of a new plant, consult with our engineers and find out how R&S can help you.

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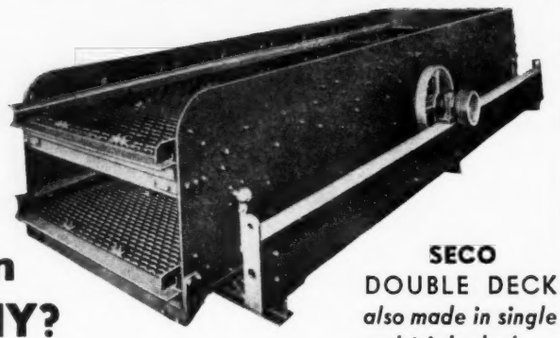

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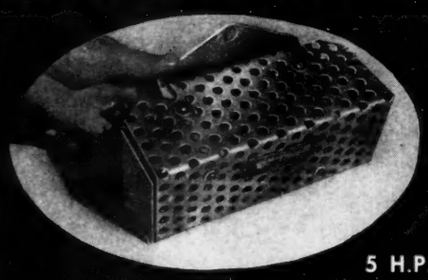
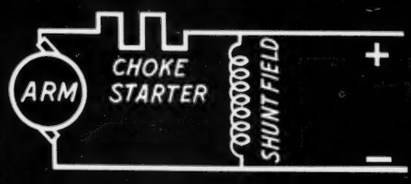


5 H.P.



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free of refuse or other material. If the roof is bad at these normal locations for crosscuts, they should be driven outby instead of inby to the normal location. When line curtain is necessary, it should be stretched tight and extend from roof to floor to make a smooth, firm surface so that there will be the minimum of resistance to the free flow of air to where it should go. Spaces between curtains and ribs should not be choked with coal, gob or other material which would retard the flow of air.

Power costs usually are tolerated as a necessary evil in ventilation. When increased air volume is needed, the general practice, Mr. Pullen remarked, has been to speed up the fan because that is "simple and inexpensive from a labor standpoint." But what about resultant power costs? An ordinary 10-ft. fan supplying 140,000 c.f.m. at 1.50-in. water gage consumes 44 brake horsepower. Speed up the fan to 173,000 c.f.m. at 2.25-in. gage and consumption rises to 83 hp. "This is not efficient ventilation."

Find out why the additional air is required, counseled Mr. Pullen. Investigation generally will disclose airways insufficient and choked; overcasts, regulators, stoppings and doors poorly installed and maintained. "Correction of these conditions spells the difference between efficient and non-efficient ventilation as well as the difference between low and high cost of power." To have efficient ventilation "extensive study should be given to maximum air-volume requirements and resistance, roof conditions, timbering requirements, rate of gas emissions, and the number and dimensions of airways."

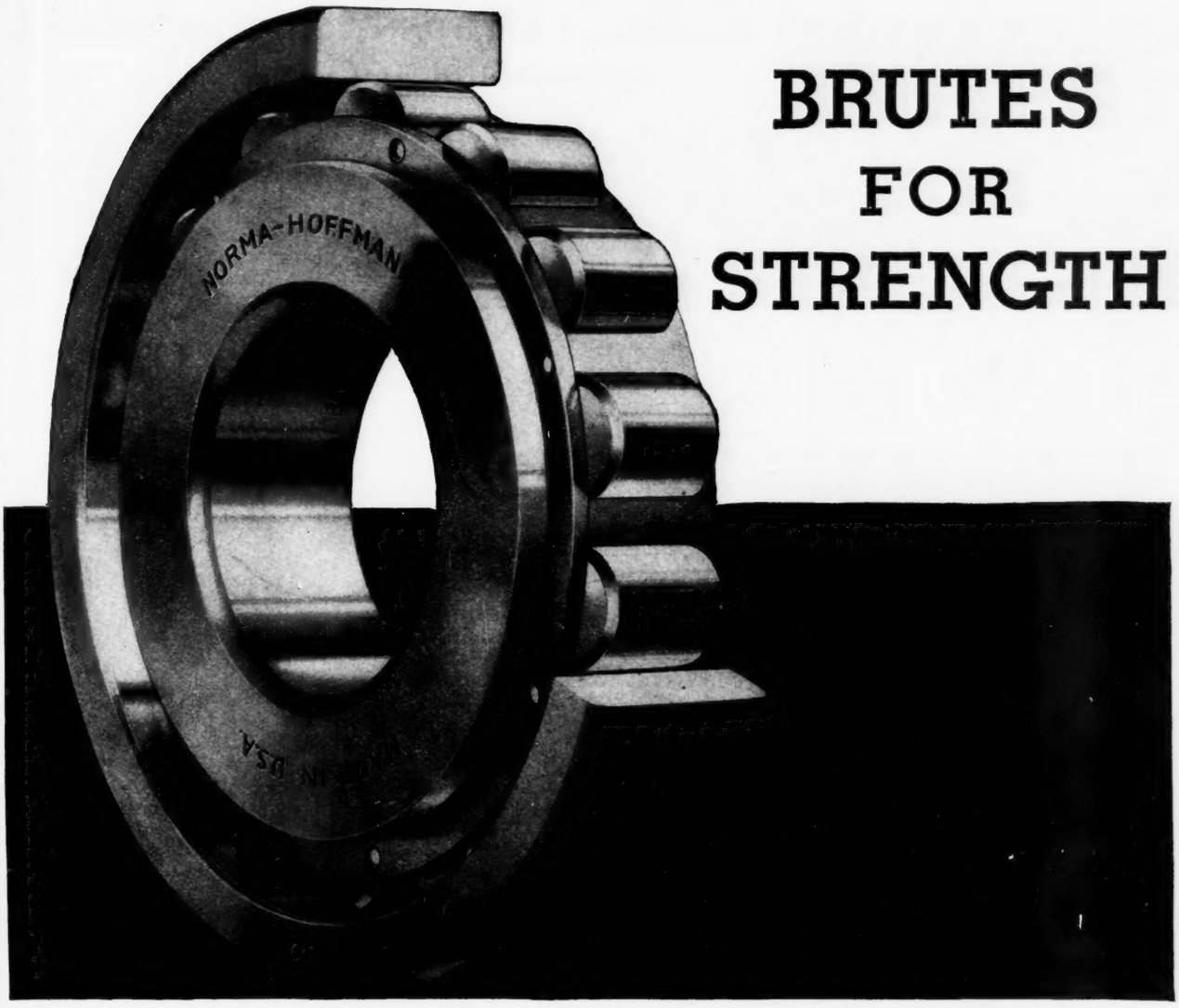
Multiple Shift Advocated

Coal operators in the future, according to R. L. Ireland, Jr., president, Hanna Coal Co., and guest speaker at the annual dinner, must look for part of their profits in greater employment of their equipment. Changing from single to multiple shifts has introduced many new problems—particularly in the field of coordination. With two shifts there rises the question of how to prevent buckpassing between two groups on the same job. Introduction of a third shift, "which is where we'll get the last squeal out of our investment in equipment," adds further complications.

With multiple shifting, how can the operator take care of the work formerly done off shift? One way, answered Mr. Ireland, is to have machinery which does not require off-shift maintenance. Another is to eliminate the causes for such off-shift maintenance. Today it is necessary to carry spares because much of the equipment now in use was not designed and built for continuous operation. Preventive maintenance will help here, and the manufacturers can provide continuous-duty machines for new installations.

Mr. Ireland urged his audience to line up in opposition to the St. Lawrence waterway scheme and to fight government hydroelectric projects. Long a leader in the camp of the opponents to the Guffey-Vinson act, Mr. Ireland declared he was still against that regulation despite the fact his mines were running full time and he was making more money. He was opposed, he explained, because he believed that the statute was fundamentally unsound.

In the interim report on vocational education, presented by M. M. Leighton, chief, Illinois State Geological Survey, figures were



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given on the progress of such education in Pennsylvania, West Virginia and Ohio. Last year there was an enrollment of 2,000 students in 100 classes in 75 centers in Pennsylvania. Two full-time supervisors and 100 part-time instructors are employed. The Pennsylvania course covers three years of 33 to 36 weeks of instruction. West Virginia had 52 classes with an enrollment of 1,737 students and nine full-time and three part-time instructors last year. In Ohio, ten classes had an enrollment of approximately 350 students under two full-time teachers.

The scope of these extension courses under the supervision of State educational authorities includes: mine gases, safety lamps, ventilation, fires and explosions, explosives, haulage, drainage and pumping, mining methods, coal geology, timbering, waste in coal mining, mining electricity, mining arithmetic, State mining laws and foremanship. It is the hope of the committee to see such extension courses established in Illinois with financial support from the Federal Government.

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Samuel J. Wills Is Dead

Samuel J. Wills Sr., 67, division superintendent for the Peabody Coal Co. at Taylorville, Ill., died Oct. 22 at St. Vincent's Hospital, Taylorville, of coronary thrombosis. Born at New Shanick, Pa., he served the Peabody company for 30 years in a supervisory capacity. Ten or more of those years he was general manager of the Penn mines in Pennsylvania, operated by Peabody for the Erie Railroad, and for five years he was division superintendent at Springfield, Ill.

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Obituary

JOHN D. DAVIS, 57, Marion, Ill., commissioner of the Illinois Coal Operators' Association for the last fifteen years, died at his home on Oct. 22 from a heart ailment.

WILLIAM F. RUST, 66, executive vice-president of the Koppers Co. when he retired several years ago, died Oct. 29 near Leesburg, Va. Mr. Rust went to Pittsburgh when 17 years old as an apprentice in the shops of the Westinghouse company. Later he attended Lehigh University. After working for a number of firms he became chief engineer and then general superintendent of the Youngstown Sheet & Tube Co. In 1915 he became chief engineer for Koppers.

FRED E. BASS, 69, mine superintendent at Commodore mine of the Clearfield Bituminous Coal Corporation, Commodore, Pa., died Oct. 28 in Indiana Hospital, Indiana, Pa., after an illness of four weeks. Coming to this country from Germany at the age of 16, he entered the employ of the Buffalo, Rochester & Pittsburgh Coal Co., joining Clearfield Bituminous in 1909.

BERT GOLDEN, 50, State mine inspector for the Mahanoy City (Pa.) district, died Nov. 10 from a heart ailment.

GEORGE W. COFFEY, 69, organizer of the War Eagle Coals, Inc., War Eagle, W. Va., of which he was president, died Nov. 11 at Williamson, W. Va., of a heart attack.

Government Aid to Drive Tunnels for Drainage Advocated in Anthracite Region

ANTHRACITE companies can take care of the water entering the mines from over their own operations but cannot handle that coming from abandoned mines of other companies, declared a speaker at an Anthracite Section meeting of the American Institute of Mining and Metallurgical Engineers, Oct. 25, Wilkes-Barre, Pa., in celebration of the seventieth year of the institute, which started its career in Wilkes-Barre in 1870, invited by Eckley B. Coxe, Martin Coryell and R. P. Rothwell. Need for tunnels to remove the floods of water entering the mines and to cut operating costs justified the presentation of a paper on the 15-mile Rosoff section of the 85-mile Delaware water tunnel now being constructed to afford New York an additional water supply.

Company Finances Inadequate

The water problem, declared S. H. Ash, district engineer, Safety Division, U. S. Bureau of Mines, cannot be solved by operating companies without State or Federal aid, or both, because of the magnitude of the job, diversity of interests of coal and surface owners, and hazards to the whole mining community and to interests affected outside the mining region.

"In solving the water problem," Mr. Ash added, "the industry does not seek assistance in handling conditions resulting from present operations but rather in coping with the flooding of properties in close proximity to abandoned operations of bygone years."

In 1939, four large coal companies in Lackawanna and Luzerne counties, comprising the Northern field, lifted 78,000,000,000 gal. of water 300 to 1,200 ft., more water than is in Lake Wallenpaupack, the largest lake in Pennsylvania. In 1937, it was estimated that 33 tons of water was pumped for each ton of anthracite mined. At 73 identical anthracite collieries, water pumped increased from 19.5 tons per ton of coal in 1927 to 21.8 in 1931 and 29.3 in 1935. Where water has to be pumped in the anthracite region, costs per million gallons per foot of lift range from 5 to 10c., averaging about 8c. Pumping costs range from 14 to 20c. per ton of coal, averaging 16c. per ton for the entire region, with an aggregate cost of about $8,000,000.

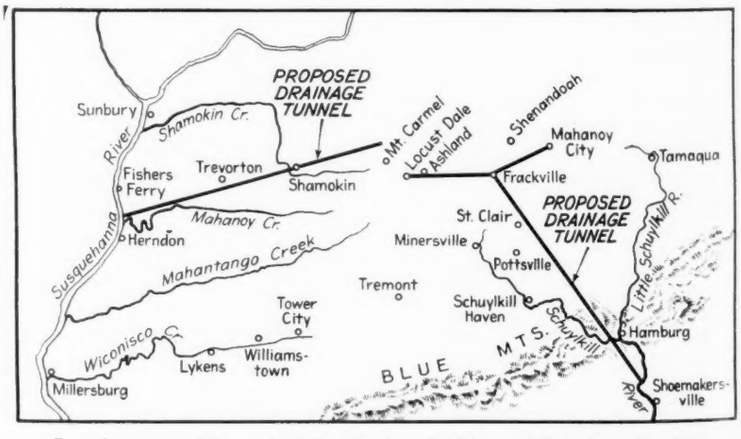
Forty-two companies in 1920 reported an installed pumping capacity of 342,000 g.p.m., and ten years later 36 companies reported 489,000 g.p.m. installed capacity; thus with six fewer companies, pumping capacity had increased 43 per cent. Coal measures in Lackawanna County are crossed by 70.6 miles of surface streams which leak into the mines at many points and, unless by pumping the water entering the mines in that county is prevented from rising, the much deeper workings in Luzerne County will be flooded as operations in the upper field are abandoned.

Realignment, regrading and riprapping Mahanoy Creek in 1933, said Mr. Ash, reduced the average pumping load of three collieries affected 42.8 per cent, comparing the three years before the work was done with the three years after its completion, although average rainfall increased 4.77 per cent. A 7-ft. flume in the Northern coal field, 5,500 ft. long decreased mine pumpage 11.62 per cent, though rainfall increased 26.72 per cent.

How Water Can Be Kept Out

Remedies for the water problem, declared Mr. Ash, are: (a) Flumes across breaks in stream beds, (b) sidehill ditches to circumvent crop falls and conduct water to stream beds, (c) diversion of streams to new and safe channels, (d) sifting of stream beds to render them less pervious, (e) cleaning and widening channels to provide freer flow, (f) control and cooperation in future mine operations to reduce inflow, (g) damming, reforestation and like developments, (h) flood control by reservoirs at headwaters, and downstream dikes which, in times of low water, might supply water for drinking and coal washing and for flushing sewage, (i) pumping plants, (j) drainage tunnels.

In earlier years, said H. H. Otto, mining engineer, Hudson Coal Co., coal resources were regarded as inexhaustible, so no one hesitated to connect one property with another; hence an overflow in one mine now may affect another mine even twenty miles away. One vulnerable spot was discovered by Mine Inspector H. R. Owens, April, 1932, in Winton Borough, where the Lackawanna



Tunnels proposed to protect the Western Middle coal field from flooding.

River flows through a gorge. Had the roof broken during a flood, entering water would have drowned the mines of the entire Lackawanna Valley.

It will be impossible to bring all the mine water in the Lackawanna region to one or two large pumping plants, Mr. Otto asserted, because such tremendous volumes of water could not travel through the workings, and large mine areas would be inundated. Costs for control can be borne only if assistance is received from State and Federal governments, added Mr. Otto, and why should it not be rendered, seeing that the anthracite coal-mining counties have as many people as the State of Colorado?

The Eastern Middle region has provided its own tunnels, declared E. B. Snyder, mining engineer, Jeddo-Highland Coal Co. Into the Jeddo tunnel system flows water from 25 square miles of mined area. However, he conceded, everywhere the basins are higher than adjacent valleys. Some artesian wells have been drained by the Jeddo system.

During the spring flood, a weir at Jeddo tunnel, March 31 of this year, said Mr. Snyder, showed the maximum flow to be 157,000 g.p.m. Plain gunite tunnel lining cost $5.50 per linear foot and reinforced gunite $22. Mr. Snyder's facts regarding anthracite water-drainage tunnels have been assembled in the accompanying table.

Defining the Southern anthracite field as extending from Mauch Chunk on the east to the Susquehanna River on the west, a distance of 70 miles, L. D. Lamont, reading a discussion presented by W. C. Muehlhof, mining engineer, Philadelphia & Reading Coal & Iron Co., said that in the last seventeen years, abandonment of collieries has flooded about 60 square miles, or 30 per cent, of the 200 square miles of the field, but has imposed thus far no additional pumping burdens on collieries still operating, though eventually it will do so.

The Western Middle anthracite field, extending 48 miles from Delano on the east to Trevorton on the west, has an area of 120 square miles. One hundred square miles, or 85 per cent, is tributary to active collieries, but abandonment from 1927 to date has reduced the active area to 50 square miles, or 40 per cent of the entire field. Here, water from abandoned collieries has had to be handled by active operations, causing the relinquishment of some of them. The Reading company is preparing to handle water from six and possibly eight abandoned operations to insure continued production from five of its mines, and the company is handling water from six other abandoned workings. Surface water admitted to mines by bootleg operations has greatly increased the quantity to be handled. Bootleggers have removed the crop coal protecting deeper workings of active and abandoned mines and have destroyed flumes and ditches of active operations. Wood from these flumes often has been used in these bootleg mines. Barrier pillars also have been removed.

A tunnel has been proposed to start at the Susquehanna River (see map) 420 ft. above tide, between Fishers Ferry and Herndon and extend eastward 22 miles to a point a mile north of Mount Carmel and another to start 330 ft. above tide between Hamburg and Shoemakersville, in Berks County, and travel northwesterly an equal distance to Frackville, Schuylkill County, where lateral tunnels would be driven eastward about 6 miles to Mahanoy City and westward about 8 miles to Locustdale. From these main tunnels, laterals would be driven to drain other collieries.

Bid price of the 15 miles of the Delaware aqueduct, declared Fred Stiefel, chief engineer, Samuel R. Rosoff, Ltd., was $19,000,000.* The finished circular section is of 13 ft. 8 in., and rock section generally of 19-ft. diameter, mostly driven in sandstones and shales which sometimes evolve methane.

Much of the roof between steel supports is gunited to prevent air slacking, and many of the walls are thus protected to prevent loss of post support due to rock disintegration. The Rosoff company recognizes safety as essential if speed is to be obtained. All drinking water is chlorinated, as also the

*About $1,266,000 a mile; that is, $719.70 a linear yard.—ED.

Water Drainage Tunnels in Eastern Middle Anthracite Field

Name of Tunnel	Date of Construction	Company	Length, Feet	Draining From	Draining to	Gradient Per Cent
Buck Mtn. No. 1	1847 and 1916	Buck Mountain Coal Co.\ Coxe Bros. & Co., Inc...	1,570	Buck Mountain No. 1 Basin\ Buck Mountain No. 2 Basin	Laurel Creek then to Lehigh River.	0.20
Jeddo A	Mar. 1891–July 1895	G. B. Markle & Co.	15,100	Ebervale, Lattimer, Milnesville, Hollywood Mines.	Little Nescopeck Creek.	0.25
Jeddo B	1892–1895	G. B. Markle & Co.	9,880	Jeddo No. 4	Jeddo A	0.34
Buck Mtn. No. 2	1895	Coxe Bros. & Co., Inc.	1,650	Buck Mtn. No. 2 Basin.	Laurel Run to Lehigh River.	0.28
Quakake	1902	Coxe Bros. & Co., Inc.	5,487	Beaver Meadow	Lehigh River	0.30
Oneida No. 1	1910	Coxe Bros. & Co., Inc.	5,150	Oneida No. 1	Susquehanna River	0.30
Oneida No. 3	1913	Coxe Bros. & Co., Inc.	7,040	Oneida No. 3	Susquehanna River	0.30
Jeddo C	1924–1926	Jeddo Tunnel Co.	4,268	Highland No. 5	Jeddo No. 4	0.52
Jeddo D	1929	Jeddo Tunnel Co.	4,038	Drifton No. 2	Jeddo C	0.40
	1929	Jeddo Tunnel Co. No. 93.	340	Eckley Mine	Highland No. 5	0.06
		Jeddo Tunnel Co. No. 96.	250	Eckley Mine	Highland No. 5	1.16
Audenried	1929	Glen Alden Coal Co.	17,000	Audenried	Susquehanna River	0.16
Jeddo Tunnel X	June 25, 1932\ Sept. 8, 1934	Jeddo Tunnel Co.	9,601*	Hazleton Shaft Coll.	Tunnel A. at Ebervale Coll.	0.17 & 0.30
Green Mtn.	?	Glen Alden Coal Co.			Susquehanna River	0.17
Sandy Run	?	M. S. Kemmerer & Co.	1,900	Sandy Run Mine	Lehigh River	0.40

*Rock work only.

Water Drainage Tunnels in Western Middle Anthracite Field

Locust Mtn. Drift	?	Locust Mtn. Coal Co.	3,800	Locust Mtn. Mine	Mahanoy Creek	1.00
Centralia	?	Lehigh Valley Coal Co.	5,100	Centralia, Locust Run, Continental.	Mahanoy Creek	0.40
Locust Gap	?	P. & R. C. & I. Co.	5,285	Locust Gap Shaft	Mahanoy Creek	0.75
Doutyville	?	P. & R. C. & I. Co.	4,810	West Spring	Mahanoy Creek	1.00

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"The House that Jacks Built"

pump discharge. Change houses also are provided.

Auxiliary ventilation exhausts immediately any methane encountered in drilling and keeps the dust count below 10,000,000 particles per cubic foot, as prescribed in the New York State Silicosis Code. Before heading crews leave the face for shooting a round, a water-air spray is placed in operation about 60 ft. from the face.

On inspection of the Rosoff job in the Delaware Aqueduct tunnel, declared J. H. Pierce, president, East Bear Ridge Colliery Co., it became evident that the job was organized in the interest of speed; every man was a specialist and had a specific duty always to be performed without interference with the work cycle. Cost was not the prime factor, as the job was a penalty-and-bonus proposition. Best obtainable equipment was provided, maintained at highest efficiency with spare parts, and supplies always in abundance.

Production of coal in the anthracite region is directly dependent on the speed with which tunnels can be driven. In anthracite mines, too much reliance is placed on brawn; too little on mechanization and work cycles. In the Hazleton district, however, the Lehigh Valley Coal Co. is advancing 16 ft. per shift with Myers-Whaley loaders. The average rock job in the anthracite mines has a crew of four drillers and from four to six muckers. The drill crew drills and fires the face of a standard 8x12-ft. tunnel in one shift, and the mucking crew clears the muck in the succeeding shift, loading eight to ten mine cars of 100 to 120 cu.ft. capacity. Progress is about 8 ft. daily.

Develop Million Tons Weekly

If 16 ft. could be driven daily in a two-shift cycle under the Mammoth bed of 50-ft. thickness with a pitch distance between levels of 250 ft., 200,000 cu.ft. of coal daily would be opened for mining. With 60 per cent recovery, this would afford a daily production of 1,800 mine cars of 100-cu.ft. capacity, which is more than the entire output of all but the largest anthracite mines when working several beds on different levels simultaneously. Such production would be restricted, however, by the speed with which coal chutes could be driven and timbered, coal loaded therefrom and transported through a single gangway; hence more than one level would have to be driven. It shows, however, that speed of rock work need not, as at present, limit production.

With speed in tunnel driving comes concentration and with that (1) fewer roads are needed, with less cost for track and trolley wire and less maintenance; (2) fewer locomotives, less power and transportation cost; (3) fewer company loaders because chutes are less widely scattered; (4) less power for ventilation because of fewer splits, lower friction resistance, fewer leaks; (5) closer supervision with efficient distribution of mine cars and supplies, more frequent inspections of working places leading to greater safety.

Faster tunnel driving may lower costs in the Southern field enough to offset the lower price realized from this field in relation to the realized price for coal from districts 1 and 7. This area has been able, fortunately, added Mr. Pierce, to supplement mine production with stripped and culm-bank coal which in a few years will be gone, and then mine production must be stepped up 25 to 30 per cent. In 1939, of the entire anthracite production of 51,400,000 tons, 2,347,000 came from refuse banks and 5,300,000 from strippings. Thus the anthracite industry as a whole must soon face an additional mine development of 7,500,000 tons annually or 15 per cent.

Gigantic Trucks Used in Strip-Mining Operations

In a coal stripping operation in Indiana in which about 20,000,000 tons of coal is to be developed the Tecumseh Coal Corporation is using five of the largest trucks in the world, all Model FC six-wheel Macks like the unit pictured. These trucks weigh 30 tons each and pack a payload of 50 tons every time they swing from under the shovel. To keep pace with them takes an electric shovel weighing 3,000,000 lb.

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Mining Congress Coal Division Meets at Pittsburgh

Members of the Coal Division of the American Mining Congress held their annual conference and dinner Nov. 15 at the William Penn Hotel, Pittsburgh, Pa. Reports were presented by the division committees on safety, mechanical loading, conveyor mining, haulage roads, underground power, roof support, surface preparation and stream clarification. The report of the first-named committee, J. J. Sellers, vice-president, Virginia Iron, Coal & Coke Co., chairman, dealt with safety rules and methods for promoting accident prevention. Cost reports was the theme of the mechanical loading and conveyor mining committees, presented by their respective chairmen, S. M. Cassidy, manager, Weirton Coal Co., and T. F. McCarthy, general superintendent, Clearfield Bituminous Coal Corporation.

Detailed study of service-haulage tracks was proposed by R. V. Clay, Hanna Coal Co., chairman of the committee on haulage roads. C. C. Hagenbuch, mining engineer, outlined the scope of the study. In the absence of the chairman of the committee on underground power, K. L. Konnerth, electrical engineer, H. C. Frick Coke Co., and F. P. Brightman, General Electric Co., took the lead in discussing the committee's proposed report on the carrying capacity of conductors. Messrs. Long, Clearfield Bituminous Coal Corporation, and Joyce, Wood Preserving Corporation, reviewed plans of the committee on roof support. Dewatering and screen efficiency was the subject of the report of T. W. Guy, consulting engineer and chairman of the committee on surface preparation. A progress report on stream clarification was offered by J. W. Woomer, general manager, W. H. Warner & Co.

R. L. Ireland, Jr., chairman of the division and president of Hanna Coal Co., was toastmaster at the informal dinner. Short talks were made by P. C. Thomas, vice-president, Koppers Coal Co.; H. M. Moses, president, H. C. Frick Coke Co.; Duncan Kennedy, secretary, Kanawha Coal Operators' Association; Carl Scholz, consulting engineer, and Charles Whaley, Myers-Whaley Co., who spoke on behalf of the Manufacturers' Division of the Congress.

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Industrial Notes

FURNIVAL-RIMMER Co., Philadelphia, has been appointed distributor for Bucyrus-Erie ⅜- to 2½-yd. shovels, draglines, cranes and clamshells in eight counties in Pennsylvania as well as in eight counties in New Jersey and the State of Delaware.

NATIONAL BATTERY Co., St. Paul, Minn., has appointed Gordon W. Mixon as general sales manager. He has been with the company since 1926.

AMERICAN MANGANESE STEEL DIVISION, American Brake Shoe & Foundry Co., has made W. M. Black president. He has been with the company since 1912, becoming sales manager in 1934 and a vice-president in 1935.

TIMKEN ROLLER BEARING Co. has named George W. Curtis as Milwaukee Division manager. Since his graduation from Carnegie Tech. in 1920 he has served in engineering and sales capacities for the company at Canton, Ohio, and Pittsburgh, Pa., as well as at Milwaukee.

COPPERWELD STEEL Co., Warren, Ohio, has appointed R. S. Clingan as Chicago district manager to handle sales of Aristoloy alloy steels. For the last ten years he has been connected with the Republic Steel Corporation.

SHELL OIL Co. has placed Joseph H. Lee, New York City, in charge of lubricant

sales east of the Rocky Mountains. The company's executive offices have been centralized in the R. C. A. Building, New York City. Mr. Lee has been with the company for the last eighteen years.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa., has appointed L. G. Atkinson as manager of sales for small De-ion circuit breakers.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has elected to its board of directors W. C. Buchanan, president of the Globe Steel Tubes Co. He was named to fill one of two vacancies on the board created by the deaths of General Otto H. Falk, former board chairman, and Oscar Gubelman.

E. I. DUPONT DE NEMOURS & CO., Wilmington, Del., has started construction of a further addition to its neoprene plant at Deepwater Point, N. J. These new facilities, expected to be completed in October, 1941, will supplement a plant addition of the same size which has just been finished. The two additions will raise the total production facilities to 1,500,000 lb. per month, six times the capacity available in the summer of 1939.

EIMCO CORPORATION, Salt Lake City, Utah, manufacturer of mine-car loaders, continuous-vacuum filters, ball mills, crushers, thickeners and other improved equipment for the mining and chemical-process industries, announces transfer of its New York branch office from 330 West 42d St. to 120 Broadway. Coincident with this change all Eimco sales in the Eastern and Southern States will be in charge of P. M. Sheriger, who has been moved to New York as district manager from his former territory in Montana and Idaho.

RAYBESTOS-MANHATTAN, INC., Passaic, N. J., has purchased the Brighton Mills plant adjacent to the Manhattan Rubber Mfg. Division, at Passaic. The property comprises about 5½ acres on which are buildings with 240,000 sq.ft. of floor space. The Manhattan Division announces that Whipcord endless belts are now available from stock in a number of sizes and in two styles—capable of handling drives from ¼ to 25 hp. and applicable to more than 1,500 different drives.

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Smoke Control Set Up in Atlanta

New ordinances carrying smoke and health provisions have been drafted by the city of Atlanta, Ga. W. E. Tidmore has been named to head the smoke abatement bureau and the Mayor has appointed a board to assist in carrying out "an equitable program in an educational manner."

•

Pryor Mine Is Safety Winner

Pryor mine of the Pryor Coal Mining Co., Pryor, Colo., won the State-wide Colorado safety contest for the first six months of 1940, according to an announcement by Thomas Allen, State inspector. The award is made on the basis of the number of man-days worked with neither fatal nor non-fatal accidents.

Anthracite Joins Opposition To St. Lawrence Project

"The Pennsylvania anthracite industry concurs whole-heartedly in the recent statements of Percy H. Johnston, president of the Chamber of Commerce of the State of New York, and of John D. Battle, executive secretary of the National Coal Association, in connection with the proposal of President Roosevelt to force action on new hydro-electric developments in the St. Lawrence River," said Louis C. Madeira 3d, executive director of the Anthracite Institute, in a statement on Oct. 21.

"We join Mr. Johnston when he 'regrets that the President did not see fit to have an impartial study made of the need and practical value of hydro-electric power in the St. Lawrence River before ordering the starting of the preliminary work.'" Mr. Madeira emphasized the fact that the $1,000,000 which the President has taken out of the $200,000,000 national defense fund is an utter waste of funds which are seriously needed in real defense applications. There is ample evidence that the people of Canada do not find any necessity for the proposed power project, nor is there any shortage now or evident need in the near future for additional power to serve Canadian defense purposes.

With ample coal supplies both in Canada and in the United States and the fact that steam plants can be built more rapidly and will produce power at a lower total cost, considering all factors of investment and other costs, Mr. Madeira characterized the St. Lawrence project as just another one of the administration's pet ideas and just as impractical and unnecessary as many other ideas which have emanated from Washington in recent years. In addition, steam-generated electric plants would spread employment materially, both at the mines and on the railroads, and help reduce unemployment.

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Stoker Standards Revised

The commercial standard for domestic burners for Pennsylvania anthracite, originally promulgated in 1934 by the National Bureau of Standards, has been revised. This action follows recommendations made earlier this year by the Anthracite Industries Laboratory. The revised standard (CS48-40) is effective for new production from Nov. 30, 1940.

•

Old Timers Honored

Birthdays of J. J. Lincoln, aged 75, of Elkhorn, and Harry Bowen, 80, of Bramwell, W. Va., both pioneer operators of the Pocahontas fields, were celebrated at a luncheon Oct. 28 at the University Club, Bluefield, W. Va. The luncheon was given by the Pocahontas Operators' Association. Thirty-five operators, representing virtually every producing operation in the Pocahontas fields, were present.

E. L. Greever, general counsel for the association, paid tribute to the fine work done by both men in developing the Pocahontas fields, stating that their efforts were "sym-

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bolic of the history of the association." On behalf of the association, Mr. Greever presented bronze clocks to Messrs. Lincoln and Bowen.

•

Coal Research Holds Attention Of Mining Electric Group

Coal in research held the attention of the Southern Illinois Mining Electric Group at its first session of the fall season, held Nov. 1 at the West Frankfort Country Club, West Frankfort, Ill. Sponsored by E. I. duPont de Nemours & Co., Wilmington, Del., L. F. Livingston, of its research department, the principal speaker, declared: "No concern ever lost money doing research work."

"Research," continued the speaker, "is responsible for greater improvement in living conditions than any other single thing." Aimed at producing, it takes an average of six years from beginning a research project to get results, he pointed out. Forty per cent of the new products brought out in the last ten to twenty years, he added, are the result of research.

Chemistry, said Mr. Livingston, touches everything from milady's makeup to the largest battleship. While there are only about 100 elements known in nature, research in the last few years has brought into being an endless variety of new things. Among these are 10,000 new alloys, 200,000 new chemical products—and millions of jobs.

Of the $250,000,000 a year spent on research, said the speaker, $7,000,000 to $10,000,000 is spent on coal research. It might jolt the average coal operator to know, he continued, that 18 to 20 per cent of the coal produced is consumed as raw material in industry. While agriculture is falling behind, spending but 0.7 per cent of its income on research, yet in 1939 275,000,000 lb. of farm products were used as raw material in industry. "There is no limit to the factory stomach," Mr. Livingston insisted.

Citing rubber as an example, Mr. Livingston declared: "There is no use in any foreign power trying to hold up America by cornering the world's supply of essential natural products, for some chemist will get busy and outwit nature." Neoprene, made from coal, limestone and salt—and better than nature's rubber, he added—is now no more expensive than rubber was during the World War. Camphor from Formosa was run up to $3.65 per pound; now we have it made from turpentine at 35 to 89c. a pound, depending on purity.

Coal, water and air (carbon, hydrogen, nitrogen and oxygen) are the raw materials from which are made nylon and lucite. Nylon is not only the basis of ladies' wear but is the cord for heatproof tires—growing stronger with heat up to 200 deg. Nylon, he maintained, is stronger and more elastic than cotton, linen or rayon. A peculiarity is that, after chemical treatment, nylon must be stretched to four times its original length, which gives it strength and elasticity.

Lucite has a wide range of applications, from roadside reflectors—said to be better than glass—to artificial teeth in artificial setting. It also is a conductor for piping light and ultra-violet rays that rivals fused quartz in being strong and unbreakable—and at, comparatively, poor man's prices. As pleasant to the touch as jade, said Mr. Livingston, it has less than half the weight of glass and is neither hot nor cold.

Officers elected by the group for the ensuing year are: president, Thomas L. Garwood, Chicago, Wilmington & Franklin Coal Co.; vice-president, C. E. Van Slyck, Old Ben Coal Corporation; treasurer, R. G. Perry, Sahara Coal Co.; secretary, Stanley Durst, Central Illinois Public Service Co.

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N.C.A. Directors Recommend Promotional Campaign

A resolution recommending to producers and affiliated interests the initiation of a nation-wide promotional campaign predicated upon the widespread advances of the bituminous coal industry during the last ten years resulting from intensive research in mining efficiency and safety and the progress in coal processing, marketing and utilization was unanimously adopted by the board of directors of the National Coal Association at a meeting in Washington, D. C., on Nov. 15.

In announcing this step John D. Battle, N.C.A. executive secretary, said that coal operators in attendance at the meeting had given enthusiastic approval in principle to the program submitted by Arthur Kudner, Inc., New York advertising counsel, based upon a survey and study of the industry recently completed by his agency at the request and in behalf of the National Coal Association.

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Tennessee C. I. to Expand

In connection with expansion of its steelmaking and finishing facilities at Birmingham, Ala., the Tennessee Coal, Iron & Railroad Co., United States Steel subsidiary, contemplates construction of an additional battery of coke ovens and development of coal-mining facilities to meet increased requirements.

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Must Deal With Union

The Diamond Coal Co., Providence, Ky., has been ordered by decision of the National Labor Relations Board to recognize the United Mine Workers as the exclusive representative of all its "production" employees at Mines 1 and 2 and to bargain collectively with that union. The company also has been ordered to desist from interfering in any manner with the organization of its employees and from coercing its workers. Complaint was issued against the company by NLRB on Oct. 12. Prior to formal hearing, the company, the United Mine Workers and counsel for the board entered into a stipulation in settlement of the case.

•

Annual Mining Institute Set

College of Mines, University of Washington, Seattle, Wash., will hold its 14th annual mining institute Jan. 20-25. Members of the college staff will give lectures or laboratory demonstrations covering the fields of mining, metallurgy and ceramics. New equipment and machinery will be exhibited, and motion pictures of current

operations will be shown. In addition, operators and engineers will describe and illustrate activities in their fields. Each day there will be a field trip to some plant of mining or metallurgical interest. Requests for preliminary information should be addressed to Milnor Roberts, dean, College of Mines, University of Washington.

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Flue Planning for Modern Homes Theme of New N.C.A. Book

A new booklet entitled "Flue Planning for Modern Homes," containing authoritative and technical material on the planning and construction of flues, chimneys and fireplaces for the specialized use and benefit of architects and building contractors, has been issued by the National Coal Association. Representing more than a year of planning and months of editing a vast quantity of material, the book points out common errors in chimney construction.

Correct data for the sizes of flues, height of chimneys, flue linings, chimney locations, foundations, materials and insulation are covered in the book's ten pages. It also carries a complete set of suggested specifications and covers construction of fireplaces in every detail; numerous illustrations are included.

N.C.A. reports having received and heard about complaints from coal operators, coal merchants, and coal-burning equipment manufacturers and their retail outlets that many new homes have been built with flues so small or inadequate in other construction details as to permanently make the use of bituminous coal impossible unless major building alterations were made. In certain territories chimney and flue construction has limited the fuels which can be used to only one—gas—with the result that when high heating costs were encountered, there was nothing that could be done about it if the customer wanted to change to lower cost fuel unless he had his entire chimney torn down and rebuilt, with larger flues and chimney.

The new booklet is intended to show professional building men that proper chimney and flue planning at the time the house is designed and built will enable the home owner to change to other fuels, if desired, later on without excessive cost or penalty. Distribution of "Flue Planning for Modern Homes" will be limited to qualified architects, building contractors, draftsmen, home-design engineers, architectural instructors and high-school and college architectural students.

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Dawson Daylight Tipple Burns

Fire of undetermined origin on Nov. 15 destroyed the tipple at No. 6 mine of the Dawson Daylight Coal Co., Dawson Springs, Ky. Two hundred men were employed at the time of the fire. Work on reconstruction began almost immediately.

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Frick Continental Plant Reopens

Preparations for reopening the Continental No. 2 mine of the H. C. Frick Coke Co., Uniontown, Pa., started late in October. Preliminary work soon hit a speedy pace, with operations scheduled to get under way early in November with about 400 miners employed.

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Trade Literature

ANTI-FRICTION BEARINGS—Link-Belt Co., Indianapolis, Ind. Folder 1846 shows a reclassification of the company's five types in prize-ring fashion: Series 100 being known as the Flyweight; Series 400, Welterweight; Series 500, Middleweight; Series 600, Heavyweight; and Series 7200, Alternate Heavyweight.

BEARINGS—S. K. F. Industries, Inc., Philadelphia. Catalog entitled "S. K. F. Spherical Roller Bearings" has its first 20 pages devoted to illustrations of roller-bearing applications in mining, crushing, steel, paper, oil, railroad, and allied fields. The remainder of the book contains information on bearing selection, time-saving computations, and drawings of various types of roller-bearing design.

BUCKETS—Blaw-Knox Co., Pittsburgh, Pa. Catalog 1757 covers the company's series of two-line lever-arm clamshell buckets. A total of 242 buckets are listed in a consolidated table giving service classifications, dimensions and physical data, and in many instances approximate cubic feet performances on different classes of material.

CAPACITOR RACK AND SWITCHING EQUIPMENT—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 49-200 treats of Type FP units for both indoor and outdoor service as a method for raising power factor or increasing feeder capacities. Informative selection and application data are given together with an outline of construction and operating features.

DIESEL CRAWLER TRACTOR—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Catalog Form MS 290, stressing performance to do the job and protection against lost time, emphasizes five main features of the new "HD 7" 54-hp. tractor: two-cycle diesel power; balanced power and speed; bimetallic clutches and brakes; new track release mechanism; and "positive seal" truck wheels.

DRYING EQUIPMENT—Louisville Drying Machinery Co., Inc., Louisville, Ky. Catalog cites salient features and advantages of the company's rotary dryers, including Type "L," which is finding use in coal preparation.

EARTH MOVING—R. G. LeTourneau, Inc., Peoria, Ill. Folder tells about the Tournapull's part in extending profitable Carryall Scraper efficiency, backed with job data and numerous halftones. The company also has introduced a simple cardboard slide rule with which it is easy to compute production performance by Carryall Scrapers and the Model A Tournapull.

ELECTRICAL EQUIPMENT—General Electric Co., Schenectady, N. Y., has issued the following bulletins: GEA-2165A, on the FK-142 oil circuit breaker; GEA-2963B, on Type TSA-14 time switches, and GEA-3191, on a.c. magnetic control for material-handling equipment.

ELEVATORS, CONVEYORS, ETC.—C. O. Bartlett & Snow Co., Cleveland, Ohio. Catalog 90, which replaces former catalogs 50 and

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74, gives complete details of the company's elevators and conveyors, chains and sprockets, crushers, gates and miscellaneous equipment.

ENDLESS BELTS—Manhattan Rubber Mfg. Division, Passaic, N. J. Drive data book lists standard sizes of two styles of Condor whipcord endless flat belt capable of handling drives from ¼ to 25 hp., also listing more than 1,500 drives of all types available with these standard stock belts.

INDUSTRIAL PUMPS—American Brake Shoe & Foundry Co., Chicago Heights, Ill. Bulletin 940 covers vertical and horizontal Amsco-Nagle units for "pumping everything but clear inactive liquids." Included are data together with characteristic curves and construction and installation views.

LOW-VEIN HAULAGE—General Electric Co., Schenectady, N. Y. Bulletin GEA-3459 cites main features and eight advantages of the company's 15-ton low height mine locomotive, giving mechanical and performance data.

OIL CIRCUIT BREAKERS—Roller-Smith Co., Bethlehem, Pa. Catalog 3630 describes and illustrates the Class 50-OC-75 outdoor oil circuit breaker of 7,500-volt rating and 50,000 kva., interrupting capacity.

PRESSURE INDICATOR—Republic Flow Meter Co., Chicago. Bulletin 801 gives a detailed description of the new and completely redesigned Republic multi-point draft and pressure indicator for use in boiler and industrial furnace operation.

RECLOSING CIRCUIT BREAKERS—I-T-E Circuit Breaker Co., Philadelphia, Pa. Catalog 2501 describes and illustrates the company's complete line of automatic reclosing circuit breakers and relays.

VALVES AND PIPE FITTINGS—Kennedy Valve Mfg. Co., Elmira, N. Y. Catalog 63 presents data on bronze and iron-body valves for low, standard and higher pressures; standard bronze and malleable-iron screwed fittings; standard cast-iron flanged fittings and flanges, fire hydrants, and various valve specialties.

V-BELTS—B. F. Goodrich Co., Akron, Ohio. Data Book 40 gives alphabetical listings of belt requirements for many industries, together with group listings of belt sizes, numerical listing of belt dimensions for V and flat belts, and conversion listings.

VIBRATION DAMPENER BUSHING—Manhattan Rubber Mfg. Division, Passaic, N. J. Bulletin 6878 describes this resilient mounting now being built into Manhattan wheels for portable grinders. Also are listed such advantages as less fatigue and increased production.

WATER SOFTENERS AND FILTERS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-210-B27 covers the Worthington hot process water softener for boiler feed water purification. Bulletin W-210-B26 pertains to pressure filters; diagrams and data table are included.

WIRE ROPE—Macwhyte Co., Kenosha, Wis. Bulletin tells in dialogue form the "Why in Macwhyte Internal Lubrication," a de-

fense against internal friction and corrosion built into Macwhyte ropes.

WIRES AND CABLES—John A. Roebling's Sons Co., Trenton, N. J. Booklet devoted to rubber-covered wires and cables contains useful information for the electrical man.

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Spring Mountain Colliery Leased

The Lehigh Valley Coal Co. has leased the Spring Mountain colliery, Jeanesville, near Hazleton, Pa., to the Stevens Coal Co. The lease became effective on Nov. 1 and operations were begun by the Stevens company on Nov. 6.

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Coal-Mine Accident Fatality Rate Shows Marked Decline

Accidents at coal mines of the United States caused the deaths of 76 bituminous and 17 anthracite miners in September last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 38,413,000 net tons, the accident death rate among bituminous miners was 1.98 per million tons, compared with 2.73 in September, 1939.

The anthracite fatality rate in September last was 4.19, based on an output of 4,053,000 tons, against 3.14 in the corresponding month a year previous.

For the two industries combined, the accident fatality rate in September last was 2.19, compared with 2.77 in the ninth month of the preceding year.

Fatalities during September last, by causes and States, as well as comparable rates for the first nine months of 1939 and 1940 were:

National Safety Council Names Committeemen

Executive committee members named for 1940-41 by the Mining Section of the National Safety Council since its annual meeting, Oct. 7-9, at Chicago, are as follows: general chairman, Cadwallader Evans Jr., Hudson Coal Co.; first vice-chairman, W. D. Haselton, Pickands, Mather & Co.; second vice-chairman, N. P. Rhinehart, chief, West Virginia Department of Mines; third vice-chairman, John Treweek, Homestake Mining Co.; secretary and News Letter editor, Daniel Harrington, U. S. Bureau of Mines; engineering committee chairman, M. L. Coulter, Clearfield Bituminous Coal Corporation; health committee chairman, Dr. A. L. Murray, U. S. Bureau of Mines; membership committee chairman, L. C. Campbell, Koppers Coal Co.; poster and slide committee chairman, J. J. Forbes, U. S. Bureau of Mines; statistics committee chairman, W. W. Adams, U. S. Bureau of Mines; entertainment committee chairman, J. T. Ryan, Mine Safety Appliances Co.; program committee chairman, J. J. Forbes.

Members at Large—J. W. Alt, Calumet & Hecla Consolidated Copper Co.; P. M. Arthur, American Zinc Co. of Tennessee; G. J. Barrett, Oliver Iron Mining Co.; Fred E. Bedale, Consolidation Coal Co.; John L. Boardman, Anaconda Copper Mining Co.; Angus D. Campbell, McIntyre Porcupine Mines Ltd.; W. H. Comins, National Lead Co.; M. L. Coulter, Clearfield Bituminous Coal Corporation; C. M. Fellman, Montreal Mining Co.; C. W. Gibbs, Duquesne Light Co.

R. Dawson Hall, *Coal Age;* H. T. Harper, Tennessee Copper Co.; H. C. Henrie, Phelps Dodge Corporation; Thomas E. Lightfoot,

UNITED STATES COAL-MINE FATALITIES IN SEPTEMBER, 1940, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft: Persons Falling down Shafts	Shaft: Other Causes	Opencut and Surface: Railway Cars	Opencut and Surface: Other Causes	Grand Total
Alabama	3	..	..	..	..	..	..	3	..	..	..	..	3
Illinois	6	2	1	..	..	..	..	9	..	..	1	2	12
Indiana	..	..	..	..	..	..	..	..	1	..	..	..	1
Kentucky	4	..	2	..	..	..	..	6	..	..	..	..	6
Missouri	..	..	..	..	..	..	..	..	..	1	..	..	1
Ohio	4	..	1	..	1	..	..	6	..	..	..	..	6
Pennsylvania (bit.)	6	..	4	1	1	..	1	13	..	..	..	1	14
Tennessee	2	..	..	..	..	..	..	2	..	..	..	..	2
Virginia	3	..	..	..	2	..	..	5	..	..	..	..	5
West Virginia	14	..	7	1	..	1	..	23	..	..	..	..	23
Wyoming	2	..	1	..	..	..	..	3	..	..	..	..	3
Total (bituminous)	44	2	16	2	4	1	1	70	1	1	1	3	76
Pennsylvania (anthracite)	11	..	4	2	..	..	..	17	..	..	..	..	17
Grand total	55	2	20	4	4	1	1	87	1	1	1	3	93

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–September, 1939 and 1940

Cause	Bituminous: Number Killed 1939	1940	Bituminous: Killed per Million Tons 1939	1940	Anthracite: Number Killed 1939	1940	Anthracite: Killed per Million Tons 1939	1940	Total: Number Killed 1939	1940	Total: Killed per Million Tons 1939	1940
Underground:												
Falls of roof and coal	342	377	1.297	1.130	87	77	2.253	2.068	429	454	1.419	1.224
Haulage	99	138	.375	.413	21	30	.544	.806	120	168	.397	.453
Gas or dust explosions:												
Local	8	12	.030	.036	3	3	.078	.080	11	15	.036	.040
Major	28	236	.106	.707	...	...	.....	.....	28	236	.093	.636
Explosives	11	19	.042	.057	13	7	.337	.188	24	26	.080	.070
Electricity	34	24	.129	.072	2	5	.052	.134	36	29	.119	.078
Machinery	21	19	.080	.057	1	2	.026	.054	22	21	.073	.057
Shaft	4	4	.015	.012	4	3	.103	.080	8	7	.026	.019
Miscellaneous	12	20	.046	.060	9	3	.233	.080	21	23	.069	.062
Stripping or opencut	7	8	.026	.024	4	2	.103	.054	11	10	.036	.026
Surface	26	31	.099	.093	12	6	.311	.161	38	37	.126	.100
Grand total	592	888	2.245	2.661	156	138	4.040	3.705	748	1.026	2.474	2.765

*All figures subject to revision.

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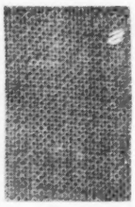

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•

Illinois Organization Drive Planned by U.M.W.

An intensive organizing drive to reach into every mining region of the State of Illinois was to get under way by the United Mine Workers, according to a declaration made by Ray Edmundson, Illinois district president. Committees were to be sent into all fields in the State, said Mr. Edmundson, with particular attention given to the Springfield and Peoria areas and to the Franklin, Williamson and Saline County fields.

Prices that smaller mine operators will be able to get under Bituminous Coal Division price schedules, said the Illinois miners' leader, will enable them to pay union scales. "The United Mine Workers are out to see that they do," he added, "and that the interests of the worker in the mine are protected."

•

Kehoe-Berge Takes Exeter Mine

Exeter operation of the Payne Coal Co., working the Red Ash seam, Pittston, Pa., has been acquired by the Kehoe-Berge Coal Co. The 200 or more men employed by the Payne company in the Red Ash operations have been absorbed by the Marcy, Babylon and Clark workings of the same company.

•

Oxyacetylene Welding-Cutting Covered in 2-Book Course

Oxyacetylene welding and cutting processes are covered in a comprehensive course of classroom exercises and lectures prepared by Air Reduction, New York City. The course consists of two separate books: one containing a complete set of work sheets, and the other lecture material to be used as a supplement to the first.

The book covering classroom exercises is intended to impress the fundamentals upon those who are interested in gaining a working knowledge of the art. Its 22 chapters describe the practice of both oxyacetylene welding and cutting.

The course of lectures, although printed in a separate book, works in close conjunction with the student exercises. It describes the history of the art, the properties of its materials, its theories and its practical applications in industry. The book has been prepared so as to broaden the horizon of the student of the oxyacetylene process and to insure intelligent application of the manipulative skill he is attaining.

The course of classroom exercises—50c. each—and lecture book—$1—may be obtained from Air Reduction Sales Co., 60 East 42d St., New York City.

LETTERS
To the Editor

Present-Day Explosives Have Better Storage Properties

Your report of the proceedings of the Nova Scotia Mining Society meeting held in Sydney, Nova Scotia, in June, as published in the August issue of *Coal Age*, has been brought to my attention.

In your report of the above I note that the paragraph second to the last contains the following statement: "Present-day explosives," conceded Mr. Ed. "deteriorate more rapidly than older types."

I wish to advise that this statement is not true and that I have been misquoted. Present-day explosives have much better storage properties than older explosives of the same type and we do not wish to have our mining friends erroneously informed on this matter.

Storage of explosives came up at this meeting as a discussion following my paper. One of the gentlemen present advised that some years ago he worked in a copper mine in western United States, and that at this mine they brought in their explosive requirements once a year. He therefore wished to know why I stressed the necessity of moving stocks rapidly and of providing such excellent storage for the explosive before it was used.

In reply I advised him that the explosives used in Nova Scotia coal mines were of the "permitted" type and that they contained ammonium nitrate. Since ammonium nitrate is hygroscopic, these explosives readily take up moisture and if they are subjected to long or unfavorable storage they will deteriorate and become unsuitable for use. I advised him that at this copper mine they were probably using a straight nitroglycerin or high nitroglycerin type of explosive and that such an explosive has very good storage properties. I further advised this gentleman that we make other types of explosive which do not contain ammonium nitrate (or contain very little) and that all of these explosives have excellent storage properties.

The statement attributed to me is not true, as it is absolutely unfair to compare a present-day "permitted" explosive of the ammonium nitrate type with a non-permitted explosive of the straight nitroglycerin type as far as storage properties are concerned. I would therefore appreciate your publishing a correction of the above statement in the forthcoming issue of *Coal Age* in order that mining men who have read your report on these proceedings will not be misled.

CANADIAN INDUSTRIES LTD.
K. M. Ed,
District Technical Representative.

WHAT'S NEW IN COAL-MINING EQUIPMENT

NEW POLYPHASE MOTOR MARKEDLY COMPACT

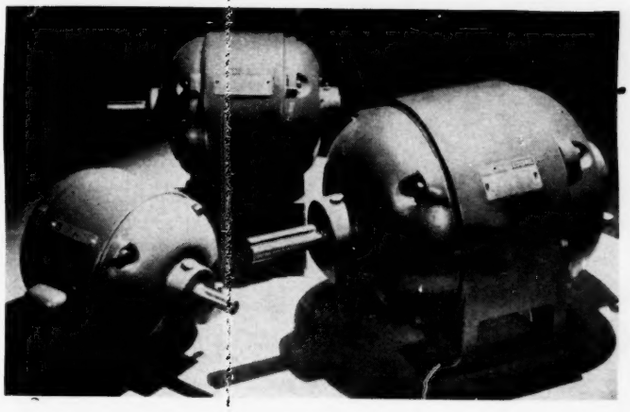
General Electric Co., Schenectady, N. Y., announces an entire line of new polyphase induction motors, known as the Tri-Clad, in integral horsepower sizes, to conform with new industrial trends, processes and practices. In all ratings, according to the manufacturer, the motor features streamlined appearance; more complete protection—through the use of a cast-iron frame — than heretofore available except in specially inclosed machines; major advances in the insulation of current-carrying parts; and improved bearing design and lubricating arrangements. At the same time it incorporates the cast-aluminum rotor, pressure-relief system of greasing for ball-bearing motors, and other proved features.

In place of the conventional open frame, the motor makes use of a cast-iron frame of the box type. The end shields are designed to match the frame and are inclosed above the center line. This combination of frame and end shields minimizes contact of vital motor parts with foreign material such as lubricants, coolants, and other liquids, as well as chips, tacks, etc., while also protecting it against accidental blows in handling or similar rough usage.

As a result of combined effort of stylists and designers, the new motor has a modern streamlined appearance, a neutral-blue smooth finish, and two-color stainless-steel name plates and monogram cap.

Improved air deflectors and fan designs, in addition to double-end ventilation, contribute materially to lower motor temperatures. In the double-end system of ventilation, cool air—drawn into both ends of the motor—immediately impinges against the coil extensions, resulting in equally low temperature of these parts at both ends of the motor.

Large, integrally cast rotor fans draw ample low-velocity air through openings in the lower portion of each end shield. Efficiency of cooling is increased through use of large, smooth air passageways and baffles which control its direction, velocity, and



discharge through openings in the frame just above the motor feet.

So far as insulation is concerned, the new magnet wire Formex is used on all ratings of the new motor, making it possible to eliminate largely the older type paper and cotton coverings and other fibrous materials which absorb moisture and over a period of years deteriorate due to the effect of heat and chemical agents. Motor windings are further protected by the application of an improved synthetic-resin varnish and a covering of Glyptal red.

The spiral-type grooving developed for the new sleeve bearing maintains an oil film over all parts of the bearing linings under heavy loads and gives assurance of thorough oil distribution under the worst operating conditions. The complete sleeve bearing utilizes hard-tin babbitt centrifugally cast into the steel shell. The bearing is rigidly supported through 360 deg. and is locked in a dust-tight, oil-tight inclosure by a removable pin.

•

ELECTRONIC PILOT RELAY

A new pilot relay offered by Photoswitch, Inc., Cambridge, Mass., is an electronic switch rendering possible control of large currents by delicate mechanisms, liquids or extremely light contact pressure normally not capable of being used to control electrical currents. Control is effected by the delicate touching of two fine wires or contacts, or by their being short-circuited by a liquid or even any moist material. Only three-millionths of an ampere may in this way control any current desired.

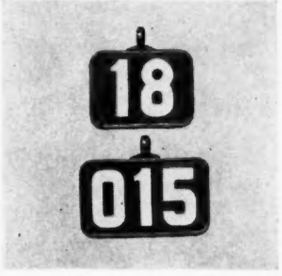
Photoswitch pilot relay is said to give indefinite life to delicate contacts on meter relays, sensitive temperature controls, electrical recording equipment, electrical precision gages, electrical flow meters, etc. It is used extensively for automatic liquid level control.

•

NUMBERING PLATES, SECTION SWITCH

Mosebach Electric & Supply Co., Pittsburgh, Pa., has developed a line of cast bronze numbering plates for marking purposes such as the numbering of face and butt entries, etc. Cast in one piece from rustproof, acid-resistant bronze alloy, the new plates are available in any size up to 3x2 ft.; minimum thickness is ¼ in. Because these letters and figures are part of the plate itself, and are raised from the surface of the plate, they never lose their high visibility.

Fitted with a shank and clevis



arrangement for hanging, the plates can, if desired, be drilled for bolting onto flat surfaces. They are ideal for permanent marking in areas which are exposed to heat, moisture or acid.

A new auxiliary section insulator switch designed to minimize electrical fire hazards and to protect electrical equipment in mines also is offered by Mosebach. Really two switches in one, the new unit consists of a standard type Mesco insulator switch combined with a smaller switch which can be fused for any desired load. Although high amperage load can be routed through the larger switch during working periods, this switch can be opened and the smaller one closed during shutdown periods. The small switch passes sufficient ampere load to operate fans, small pumps, etc., but if the amperage is suddenly increased, the fuse burns out, stopping all current and protecting the equipment at the face. Durably constructed, the new switches are fitted with extra heavy contacts and blades, and with a locking device to prevent accidental closing.

•

RESPIRATOR

Development of an exceptionally light and efficient respirator to protect the respiratory system against dusts, pollen and bacteria is announced by the American Optical Co., Southbridge, Mass. Weighing only 1½ oz. and excluding particles as small as a micron—1/25000 in.—the device was developed to provide comfortable protection for those working in dusts; persons allergic to pollens causing hay fever and asthma; and doctors, nurses and patients exposed to certain air-borne bacteria.

The effectiveness of the unit, according to the company, is

due to four improvements: a new method of making the filter unit, resulting in an extremely large, efficient filter area for the size of the mask; a new and efficient exhalation valve; a new, self-equalizing, double headband which holds the respirator securely but comfortable against the face regardless of the position of the head; and a facial design that enables one to wear the device with perfect comfort.

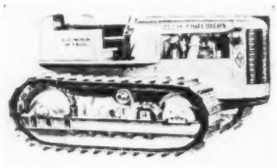
Tests made by the U. S. Bureau of Mines, says the company, resulted in approval of the respirator for protection against the inhalation of silicosis-producing dusts.

•

DIESEL-POWERED TRACTOR

Announcement by Allis-Chalmers Mfg. Co., Milwaukee, Wis., of its new 54-hp. Model "HD 7" brings its line of 2-cycle General Motors diesel-powered tractors up to three models. In addition to low fuel consumption and smoothness of operation of its engine the "HD 7" offers 11 of the other features of its "big brothers."

Included in these features are the following: long-lasting Velvetouch bimetallic clutches and brakes; positive seal truck wheels and idlers, requiring lubrication only once each 200 hours of operation; trackless release-spring mechanism which reduces wear on tracks and prevents unnecessary strain on other tractor parts.



This new unit weighs about 13,000 lb. in the 63-in.-tread model; the 52-in.-tread machine, 12,500 lb. The four-speed transmission gives a choice of forward speeds from 1.84 to 5.82 m.p.h.; reverse is 2.19 m.p.h.

Equipment suitable for use with the "HD 7" includes 5-yd. two- or four-wheel scrapers, 8- to 10-ft. blade graders, sheepsfoot rollers, 7-yd. wagons, bulldozers, angledozers and others.

•

DIESEL LOCOMOTIVE

The new Model BMG locomotive was developed by the Brookville Locomotive Co., Brookville, Pa., to make the economy, lugging ability and safety of diesel power available in an exceptionally high powered unit confined to a height of only 56 in. to permit passage under low clearances. The engine is a General Motors Series 71-6 two-

stroke cycle diesel developing full 120 diesel horsepower and furnishing 12 hp. per ton of locomotive weight. Applied through a range of four speeds, in both forward and reverse, this abundance of flexible power makes possible a high speed up to 15 m.p.h., negotiation of heavy loads on grades on the higher gears, and consequently high daily tonnage.

Performance is said to be still further improved by drive on all four wheels, steel tires which increase traction at least 25 per cent over chilled-face wheels, dual journal spring suspension which permits negotiation of rough, uneven tracks or sharp curves at relatively high speed, and Timken tapered roller bearings in all wheel journals.

•

FOUR-WHEEL SCRAPERS

A new, improved line of four-wheel scrapers in a complete range of sizes matched to the new line of International Trac-TracTors has been introduced by Bucyrus-Erie Co., South Milwaukee, Wis. To simplify operation, to lessen chances for breakdowns and time losses, and to keep maintenance costs at a minimum, these units are so simply designed that they have only five main parts: (1) frame with side-plates, (2) tilting bowl (3) apron, (4) tongue assembly, (5) rear axle assembly.

Using two-line cable control, one cable to control height of digging edge and the other to control the opening of the apron and tilting of the bowl, these scrapers give accurate depth of both digging and spread.

The tilting bowl consists of a simple reinforced double-bottom plate curved below and behind the dirt, and rotating between the fixed side-plates of the frame. The front edge of the tilting bowl is hinged to the frame, just behind the digging blade, by means of a full-length solid bar. As it rotates about this hinge in dumping, the bottom of the bowl lifts, thus ejecting the dirt with a rolling motion. Since this ejection has the aid of gravity, says the manufacturer, minimum power is required to accomplish clean, positive dumping.

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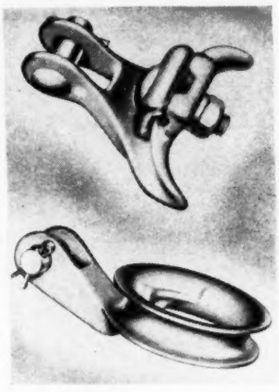
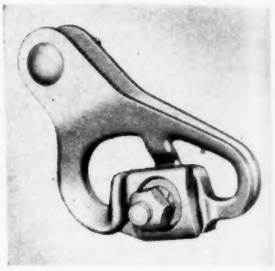
CLEVIS ON ANGLE CLAMP; SMALL STRAIN CLAMP

Supplementing the angle clamp and dead-end thimble designs in which the clevis is parallel to the conductor, Ohio Brass Co., Mansfield, Ohio, has brought out designs with the clevis at right



angles to the conductor. These new devices were developed for users who prefer to have more flexibility in the vertical than in the horizontal plane. Angles from 10 to 120 deg. can be turned with the angle clamp without dead-ending the conductors and using jumpers. No parts need be removed for attaching a conductor because it is a one-piece assembly in effect. It will accommodate any conductor from 0.162 to 0.600 in. The dead-end thimble has an open seat which is in line with the clevis and therefore the conductor's line of pull. This device is suitable for dead-ending, angle construction and making branch line taps. Both devices are made of malleable iron, hot-dip galvanized.

Several improvements have been incorporated by O.B. in its smallest strain clamp, known as the Baby Universal. These changes make the clamp easier to install, increase its holding power, permit accurate conductor alignment and add to the mechanical strength, it is asserted. The nose of the clamp has been extended beyond the clamping portion to form a loop which serves as a convenient anchorage for the hook on the block and tackle



normally used for sagging line conductors.

To give the lengthened clamp additional strength, a reinforcing rib has been inserted in the middle of the body casting. With the extended nose, the clamp has a longer V groove, which provides a better grip of the cable. The holding power is increased even more by an S-shaped wave in the clamping seat. This wave causes the jumper on the no-load side to take off at such an angle that it will safely clear the entering loaded conductor. Even though this clearance is provided, the tensioned conductor always remains in line with the support, for the clamp has no tendency to turn because the full length of the V groove from the nose to the clamping seat is in the same vertical plane as the sagged conductor and is perpendicular to the clevis pin.

Only one wrench is needed to install this clamp because two lugs are provided on the main body casting to prevent the head of the bolt from turning when the nut is being tightened. However, the lugs are so arranged that a wrench can be used to hold the bolt head if desired. To permit development of greater holding power, a machine bolt has been substituted for the carriage bolt used in the older design. To accommodate this additional pressure, the keeper piece, in turn, has been made heavier. A ridge in the main casting engages the unused conductor groove of the reversible keeper piece, preventing the keeper piece from turning when being tightened and assuring a snug fit over the conductor. The Baby Universal, smallest of three Universal strain clamps,

COAL NOW RIDES THIS *Magic Carpet* FROM FACE TO TIPPLE!

AN ADVANCE LOOK INTO 1941 reveals more mine operators and builders of belt conveyor systems putting their heads together for the purpose of mechanizing mines . . . for richer yields and greater profits.

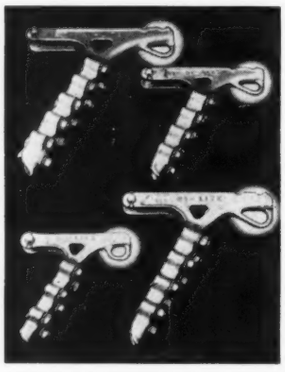
Methods and equipment that are expensive and inefficient by comparison with modern belt conveyor systems will be tossed out. New coal seams will be reached, output increased, operating costs reduced. Handicaps of low ceilings will be eliminated . . . uneven floors no longer a problem. More mines will carry more coal on U. S. Rubber Conveyor Belts... room, mother, slope, surface and preparation plant. Working closely with these mine operators and builders of belt conveyor systems are U. S. Rubber engineers, called in to consult on and to provide the best belt for each assignment... belts that give SERVICE BEYOND PRICE AND SPECIFICATIONS. Perhaps we can be of help in planning the mechanization of your mine?

United States Rubber Company

1230 Sixth Avenue, New York, N. Y.

accommodates 0.145- to 0.350-in. conductors. All parts are hot-dip galvanized to prevent corrosion.

To simplify the job of dead-ending conductors, O. B. has added a stringing loop under the nose of three of its strain clamps, known as the Hi-Lites. This loop makes it possible to attach the "blocks" for securing proper conductor tension directly in the clamp. When the tail block is hooked in the new loop and the conductor is brought to tension, the entire dead-end assembly assumes a position that is practically a continuation of the conductor. Thus it is not necessary to compensate for slack wire between the come-along and clamp, as required when the tail block is held by a sling placed around the pole or crossarm.



In addition to simplifying the procedure of dead-ending, the loop permits more accurate sagging of conductors. The loop is an integral part of the clamp body casting and has ample strength for any tensions to which it may be subjected. The three clamps redesigned have conductor ranges without liners of 0.400-0.680, 0.675-0.800 and 0.790-0.930 in. A fourth clamp, having a range without liners of 0.400-0.550 in., was previously given a stringing loop.

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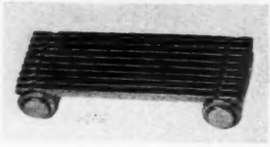
WEDGE-WIRE SCREENS

Wedge-wire screens for dewatering, drainage and separating coal, slurry and various effluents are offered by Wedge Wire Corporation, Cleveland, Ohio. These screens, the company points out, are made of wedge-shaped or undercut bars which are formed integral with solid heavy loops, spaced at definite intervals. These "loop-bar" strands are in turn securely fixed in grid form by strong cross rods which are firmly riveted or bolted in place.

Screens, sieves and grids can be had in practically any metal, the manufacturer states, the most



commonly used being stainless steel, brass, phosphor bronze, Monel metal, steel, aluminum and copper.

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BEARING PACKER

The need for fast and positive bearing lubrication is met by a Croft packer distributed by Ahlberg Bearing Co., Chicago. It thoroughly lubricates a large bearing in one easy operation and at the same time conserves grease. The unit is built to take bearings from ½ in. i.d. to 7 in. o.d.

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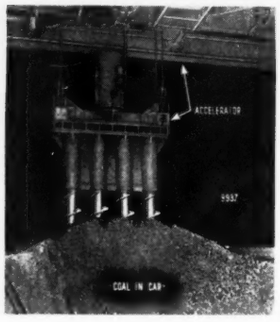
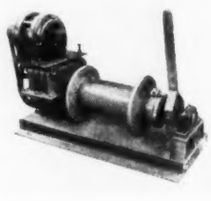
COAL ACCELERATOR

To save time and labor in unloading high-moisture-content coal, frozen coal, and moist slack heavy in bug dust, Stephens-Adamson Mfg. Co., Aurora,



Ill., offers its coal accelerator. Consisting of four vertical screws, traveling crane and operator's cab, the accelerator, according to the manufacturer, is of flexible control, permitting rapid changes of position, either vertically, horizontally or laterally; it also is easily stopped, and the direction of the screws can be quickly reversed.

This company also announces addition of a new SACO speed reducer winch to its line. Furnished in a variety of sizes to handle very small or large capacities, one of its outstanding features is a jaw clutch which releases pulling rope when disengaged. This feature is of particular significance where it is necessary to carry the pulling rope a considerable distance to attach to the object to be moved. Ordinarily it is necessary for the operator to run a winch in reverse direction to pay out rope; with the jaw clutch releasing pulling rope, this is unnecessary.



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HEAVY CRAWLER CRANE

Lima Locomotive Works, Lima, Ohio, has added a new heavy-duty 60-ton crane to its line of shovels, draglines and cranes, making the company's current line of cranes range in capacities from 15 to 60 tons.

Some of the features incorporated in the line include: Independent clutches—hoist, travel, swing and boom up or down simultaneously; four drums—including worm-driven boom hoist; smooth operating clutches, controlled by vacuum, so that loads are hoisted or lowered with utmost precision; helical cut gears throughout the main machinery reduce backlash and effect smooth, quiet operation; roller bearings at every vital bearing point reduce friction and lessen repair bills; square lever shafts—no keys to work loose; positive lever action; arrangement of main machinery affords proper balance for handling long booms at low angles; special steels used throughout, to effect long and profitable operation, with few delays; big-diameter drums with wide face effect great cable economy.

•

WICK FEED OILER

A new visible unbreakable wick feed oiler is announced by the Trico Fuse Mfg. Co., Milwaukee, Wis. The oiler is intended for economical use on machinery which operates intermittently. The lever at the top, when in a vertical position, starts the feed, and when flipped to the side shuts off the feed; no flooding and waste of oil when the machine is idle. The oil supply is always visible and the crystal clear unbreakable reservoir tells at a glance when refilling is necessary.

When the oiler is filled above the point where the wick enters the center tube, the surplus oil drains into the bearing, thus flushing it thoroughly. When the oil recedes to the opening in the tube, the wick automatically feeds oil to the bearing by capillary action. Dirt or sediment cannot enter the bearing. This oiler is light in weight and there are no gaskets to leak, as the bottle is cemented and roll-clinched to the heavy brass base. All metal parts are bright cadmium-plated for easy cleaning. It is made in 1-, 2- and 4-oz. capacities.

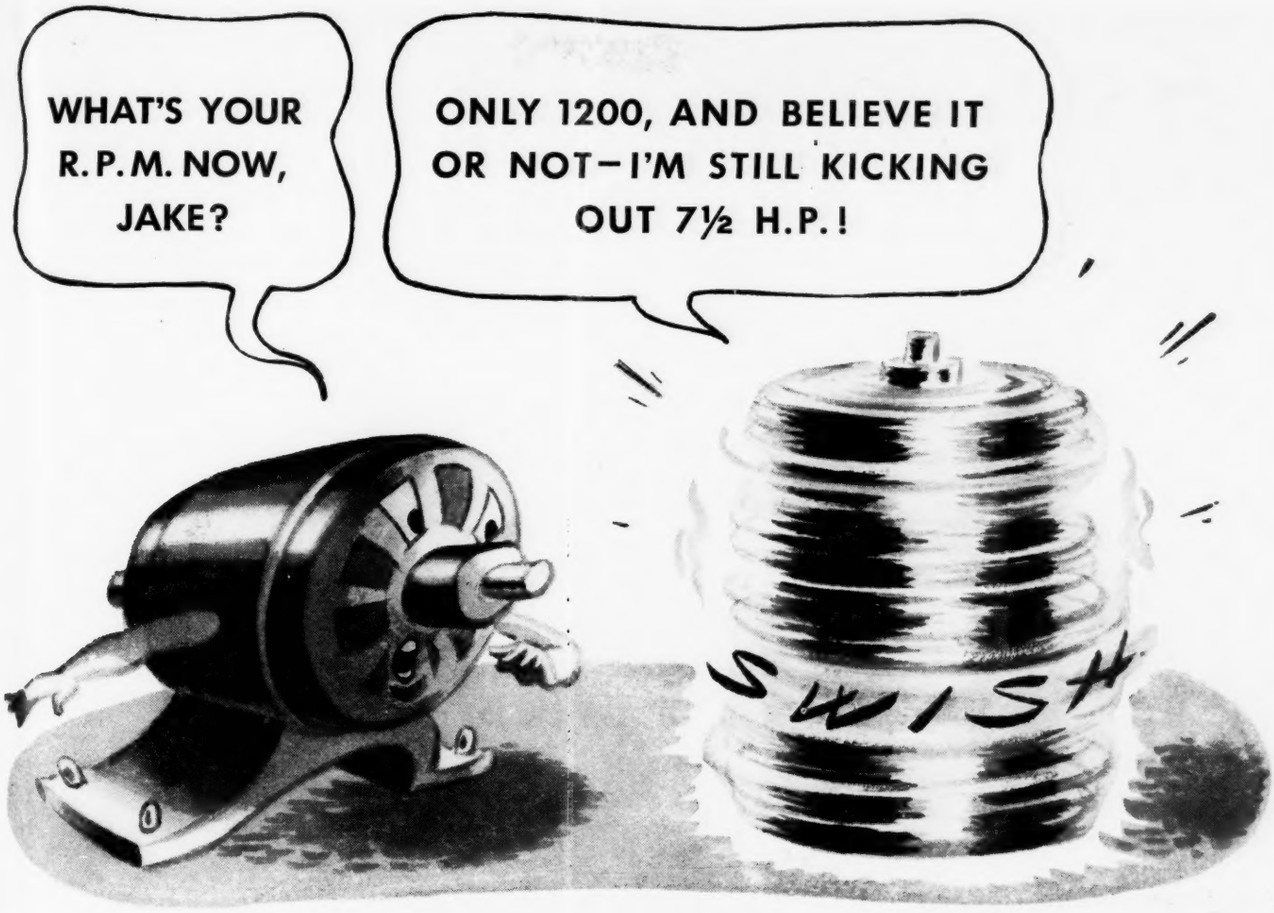
•

RESILIENT PRESSURE PAD FOR BRUSH HOLDERS

To offset the injurious effects of vibration on carbon brushes, National Carbon Co., Cleveland, Ohio, has perfected brushes with a resilient pressure pad secured to the holder end at the point of contact with the pressure finger. The use of these pads, where vibration of great severity is encountered, it is said, materially reduces and may even eliminate such destructive effects as chipping and cracking of

brushes, wear on the holder end of the brush, and wear of the pressure finger tip.

Within the range of temperature normally encountered on electrical equipment, the pad will retain its resiliency throughout the life of the brush. The form of the pad and its exact location on the brush are dependent on the shape and dimensions of the pressure finger and the location of its contact with the brush.



Space factor of Fiberglas* Insulation permitted same H. P. at Fewer R. P. M.

A BROOKLYN, N. Y. manufacturer of fine furniture had three motors side-by-side, operating a 3-drum sander-machine. They were 7½ horsepower A. C. jobs, each turning over 1800 r.p.m.

The manufacturer wanted to reduce the r.p.m. of his motors, so that he could change from belted drive to direct drive. The obvious way to do this would be to put in a slower motor with a larger frame size.

But there were only ⅛ inch clearances between the motor frames!

So, as a test case, he decided to rewire *one* of these motors to run slower. Fiberglas Electrical Insulation was used because its *greater* space factor permitted the additional windings required. This slowed the motor down to 1200 r.p.m., but still allowed it to deliver its full rated horsepower.

That was 15 months ago and not one penny's worth of maintenance has been spent on the test motor, which operates as much as 20 hours a day.

No wonder the manufacturer has decided to rewire the other two sander-machine motors with Fiberglas!

What This Means To You

There are two other variations on this small-motor trick of getting the same H. P. at lower r.p.m. You can get *more* horsepower out of your cotton insulated motors *without* increasing frame size by substituting Fiberglas Insulation, thereby allowing operation at higher temperatures. And you can get *more* horsepower *without* increasing weight.

Or you can get the *same* horsepower you have now by this method . . . in motors that are both smaller *and* lighter.

How To Go About It

Write today for Fiberglas Electrical Engineering Data. Find out why insulation made from this glass in fibrous form has superior electrical insulating properties, how it withstands high temperatures, how it resists acids, oils, and chemicals, how its many other advantages can add up to important maintenance savings for you. Pick the toughest job you have. Put Fiberglas insulation in *that* spot . . . and see for yourself! Owens-Corning Fiberglas Corporation, Toledo, Ohio. In Canada: FiberglasCanada, Ltd., Oshawa, Ontario.

OWENS-CORNING

FIBERGLAS*

*T. M. Reg. U. S. Pat. Off.

TOLEDO, OHIO

SPECIFY FIBERGLAS ELECTRICAL INSULATION

SUPER SERVICE*

First in Performance

Through all the years since hydraulic-press-vulcanized Super Service was first introduced, it has been the top-flight performer in coal mine service. The tons of pressure, by which its internal structure and jacket rubber are compacted, effects an ability to resist the most gruelling mine abuse. To this basic superiority is added the unusual quality of Super 6-T jacket rubber compound—tough and tear-resistant in the highest degree. "Super Service" means "First in Performance".

*Trade-mark

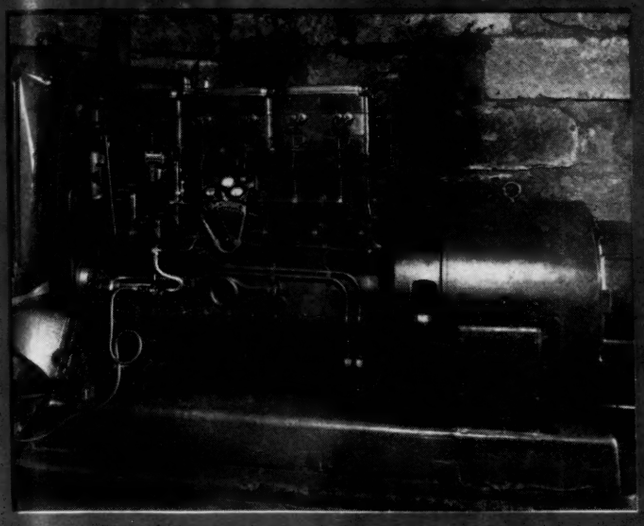
GENERAL CABLE

GENERAL CABLE

BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE

General Cable Corporation Sales Offices: ATLANTA · BOSTON · BUFFALO · CHICAGO · CINCINNATI · CLEVELAND · DALLAS · DETROIT
KANSAS CITY (MO.) · LOS ANGELES · NEW YORK · PHILADELPHIA · PITTSBURGH · ROME (N.Y.) · ST. LOUIS · SAN FRANCISCO · SEATTLE · WASHINGTON (D.C.)

It's the low upkeep that counts!



This Cummins Diesel-electric unit supplies power for one of the many coal mines lubricated with MARATHON "Prescription" Lubricants. MARATHON V.E.P. OIL has been used exclusively since installation.

• Whether you are struggling along with an antequated power unit, or have a brand new up-to-date engine, your job is to operate as economically as possible. Freedom from interruptions, escape from time-consuming maintenance and servicing—in short, LOW UPKEEP is what *really* counts. And it is here that correct lubrication becomes your principal ally. It is of such importance that, truly, economical operation *demands* correct lubrication.

MARATHON V.E.P. OIL

Gives you

MAXIMUM PROTECTION
LOWER MAINTENANCE COST
MORE EFFICIENT OPERATION

• • •

How?

Call in one of our Lubrication Engineers and let him tell you *exactly* how these advantages will apply to your particular requirements.

• • •

MARATHON
"ALL IN THE LONG RUN"

THE OHIO OIL COMPANY
INCORPORATED
GENERAL OFFICES — FINDLAY, OHIO

COSTS GO DOWN

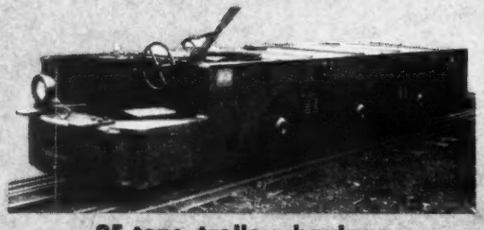
PROFITS GO UP

You haul LESS TOP, MORE COAL with this AMAZING NEW low-vein locomotive

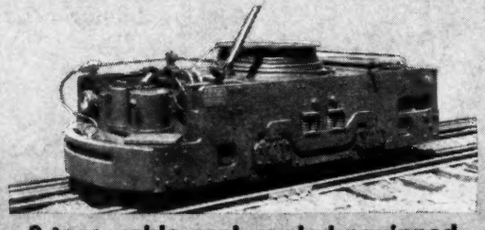
WHY waste hundreds of thousands of dollars taking useless top out of low-vein haulageways just to accommodate old-fashioned equipment? Now you can get a 15-ton haulage locomotive only 26 inches high—9 inches lower than any other motor with equal weight and power.

Besides compactness, this amazing locomotive has many features not found on ordinary locomotives, including: air brakes, air sanding, 10-step electro-pneumatic control, air-raised trolley, and adequate space for the motorman and trip rider. Its two 90-hp, high-torque motors start heavy loads quickly and smoothly, with starting currents hardly noticeable at the substation.

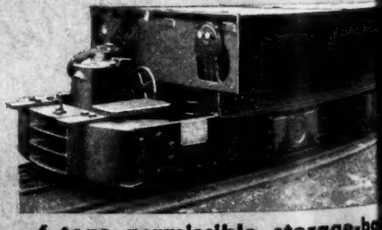
THERE'S A G-E LOCOMOTIVE FOR EVERY JOB



25 tons, trolley, haulage

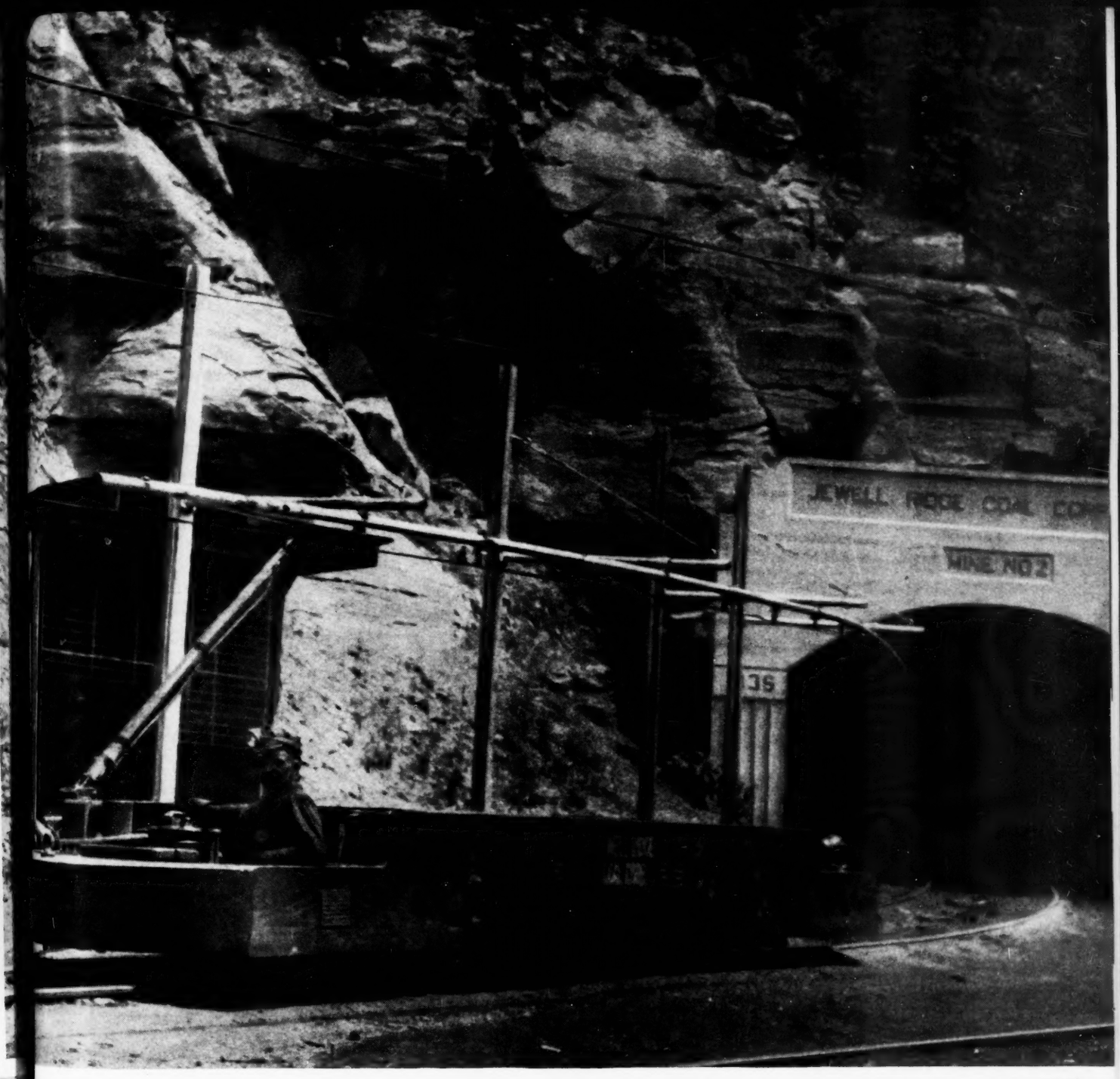


8 tons, cable-reel, sealed-equipped



6 tons, permissible, storage-b

50 YEARS of experience have given us a vast store of basic knowledge for improving mine motive power. Because G-E locomotives are built entirely in our own factories, we are able to co-ordinate the improvements and give you modern, money-saving, completely reliable units. May we show you important advances made recently in cable-reel, battery and trolley types?



Don't wait for your old motors to break down. Start cutting haulage costs and earning extra profits quickly—just as soon as you can get one of these locomotives into your mine. General Electric, Schenectady, N. Y.

Now you can get a locomotive to fit your mine instead of digging a mine to fit your locomotives

General Electric, Section B126-6
Schenectady, N. Y.

Send Bulletin GEA-3459, which reveals how your new 15-ton locomotive is held to 26 in. high without sacrificing one important feature.

Also data on ..... *type locomotives.*

Name .....

Company .....

Address .....

.....

126-6

GENERAL ELECTRIC

One New Year's service you're always sure of receiving!

Once a year COAL AGE has a reversal in form! For eleven issues every year, since the founding of COAL AGE thirty years ago, editors and contributors treat present operating practices and future trends which advance the coal industry towards lower costs per ton. But once each year, in February, COAL AGE indulges in the privilege of "looking back" at the record and bringing to its readers a review of the progress which this basic industry recorded during the year. . . . And as an additional value, our editors look into the "crystal ball of the future" . . . With 29 previous issues of this kind before us we take great pleasure in announcing COAL AGE's 30th ANNUAL REVIEW & PROGRESS NUMBER

TO OUR ADVERTISERS:

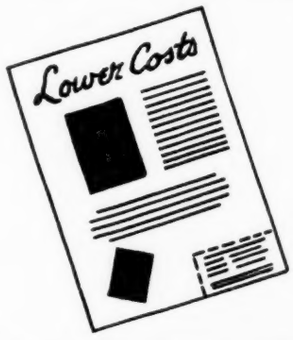
COAL AGE'S 30th Annual Review and Progress Number

. . . and a New Year's gift for YOU — "Mr. Advertiser"!

With this December issue COAL AGE is now offering you 11,500 net paid (A.B.C.) subscribers—an increase of 57% over the same issue of 1938 — and because of the continued progress brought about by an increasing number of "on-the-spot" editorial surveys, made possible by an enlarged editorial staff, COAL AGE offers you access to the increasing interest of the men in the coal industry who determine the success of your product in this field.

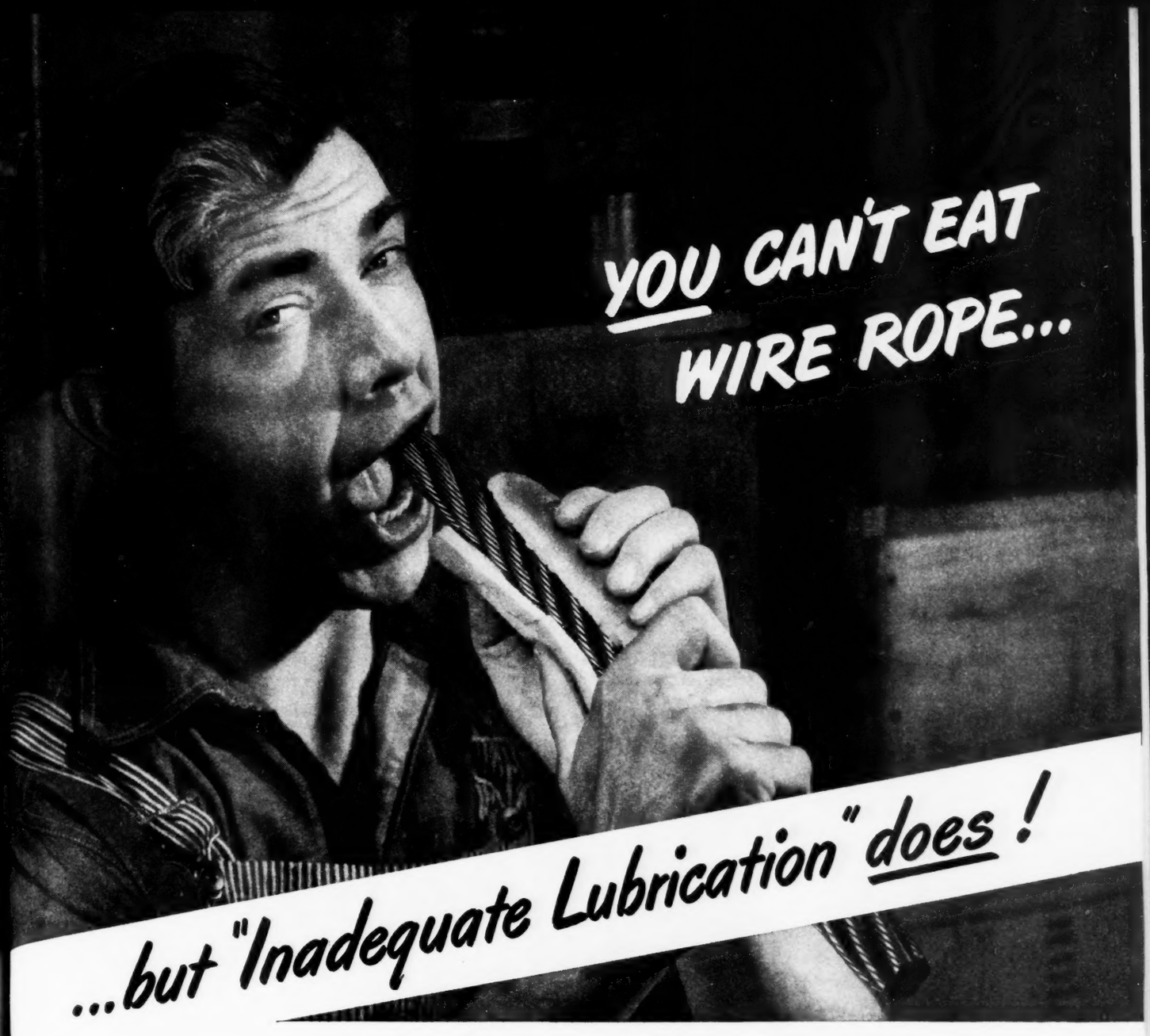
More and more manufacturers are turning to COAL AGE to sell their products. During 1940 COAL AGE has brought its readers over 950 pages of advertising —*more* information on *what* to buy and *where* to buy it than *all* other U. S. A. publications combined devoted *exclusively* to coal mining and its problems.

MAY WE SUGGEST—



That you plan your "TELL-ALL" advertisement to repeat the same story your best salesman tells when he has a chance to "tell-all" to the right man in the right place at the right time!

Final Forms Close January 15th—Reserve Your Space NOW!



...but "Inadequate Lubrication" does!

Perhaps you never thought of lubrication in just this way — but picture to yourself thousands of tiny "bearings" sliding and pressing against each other. Naturally, they must be lubricated — and naturally you'll see that they are lubricated in your wire ropes — when you realize what it means in dollars and cents.

A proper wire rope lubricant regularly applied to the rope on the job, forms a protective coating that keeps those thousands of "bearings" operating with minimum friction. The result: — Wire fatigue and corrosion checked; more uniform wear; longer rope life.

Be sure your lubricant is the *right* one, that you are applying it properly and with sufficient frequency.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

CORRECT LUBRICATION:

1. *Reduces Rope Wear*
2. *Prevents Corrosion*
3. *Prolongs Rope Life*
4. *Lowers Operating Cost*
5. *Provides Greater Safety*

This advertisement is published in the interest of all wire rope users to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING

JAR *Wire Rope*

Ask about ROEBLING "BLUE CENTER" WIRE ROPE *either preformed or standard*

DINGS MAGNETIC SEPARATION

Preparation is the big coal sales feature today and removal of tramp iron from stoker coal is one of the biggest sales-getting features in modern coal merchandising. Take a look at the Peabody Coal Company advertisement reproduced here. It's addressed to dealers. *Peabody takes the iron out—and tells 'em so!*

You've got to do the same and electromagnetic separation is the one positive and economical way to do it. The Dings Magnetic Separator Company builds a complete line of powerful *High Intensity* separators for this purpose. The Dings Magnetic Pulley, as illustrated at Peabody Coal Co., is the most powerful pulley on the market size for size! It's scientifically built with *bronze* coil covers instead of the customary steel which tends to short-circuit lines of force. It has more *air-cooling* area than any other pulley because heat destroys magnetic pull. No iron gets by this unit!

In addition to the pulley, Dings builds a complete line of Spout Magnets, Magnetic Drums and other models for use with belt conveyors, on loading booms, in chutes, etc.

No other method is as effective and partial iron-removal is little better than none at all.

Can you tell dealers and prospective dealers that you'll ship coal iron-free from the mine? If not, don't pass up this sure-fire opportunity for bigger sales. Write to Dings right now! DINGS MAGNETIC SEPARATOR COMPANY, 535 Smith St., Milwaukee, Wisconsin.

Dings
MAGNETIC SEPARATION
HIGH INTENSITY

World's Largest Exclusive Builders of Electro-Magnetic Equipment Separation Headquarters Since 1889.

Are your cars and haulage equipment of the type to give you greatest efficiency in operation?

● Haulage costs per ton mile have a mighty bearing on your *profits* per ton mined these days.

For example — who are the manufacturers of Mine Cars and Locomotives who have put last-word engineering thinking into helping you tackle this problem along cost reducing lines? What equipment and services do they offer for your 1940 mechanized mining program?

These leading manufacturers are supplying you with the latest information in 1940 COAL MINING CATALOGS.

Just another example of the daily uses mining men make of this important COAL AGE Annual Service.

COAL MINING CATALOGS, 330 West 42nd St., New York, N. Y. C.A. Dec., '40

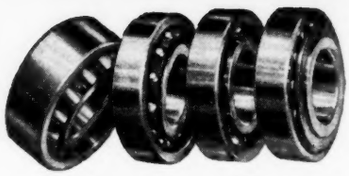
Gentlemen: I am responsible for specifying and requisitioning equipment and supplies needed at our property and do not have access to your COAL MINING CATALOGS. Please forward a copy of the 1940 edition to me. (If my country imposes a duty on such Catalog books, I agree to pay same).

Name ..... *Title* .....

Company Name .....

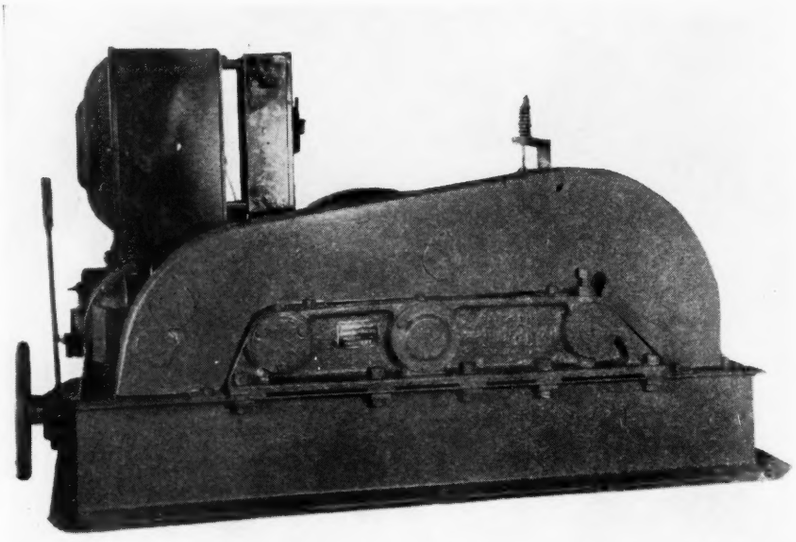
City Address ..... *State* .....

The nature of our operation is .....



Vulcan picks SKF *for* HOISTS

to INSURE PERFORMANCE



SKF *Bearings are on the intermediate shaft of this 5 H.P. Car Spotter Hoist.*

BUILT BY VULCAN IRON WORKS, WILKES-BARRE, PA.

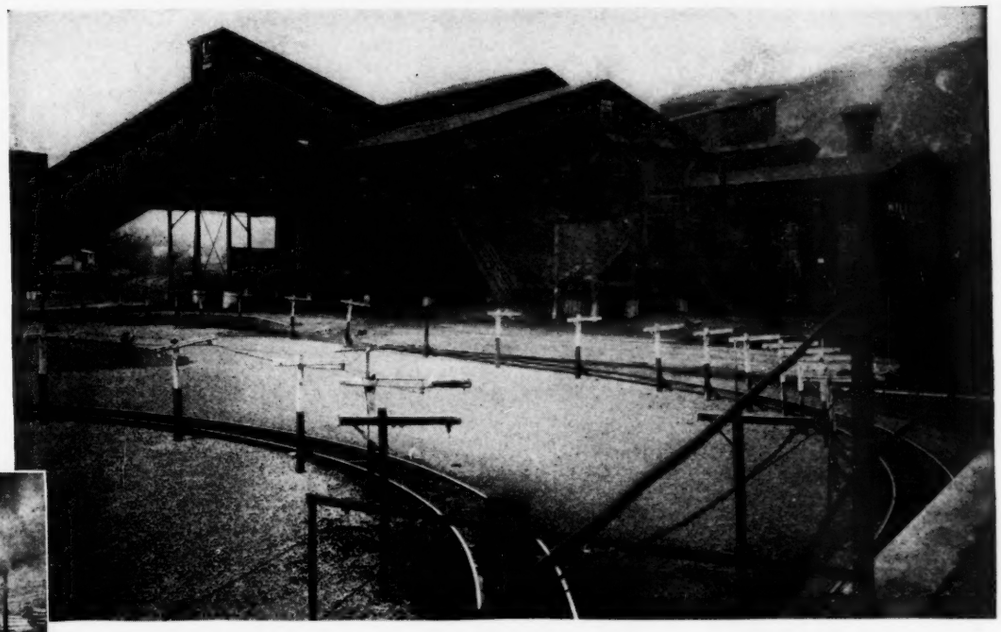
PERFORMANCE—in this one word are summed up the many reasons why The Vulcan Iron Works selected SKF Bearings for this 5 H.P. Car Spotter Hoist.

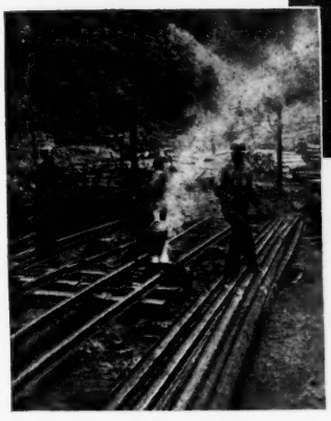
It means that correctly-designed SKF Bearings, with their high capacity and equalized load distribution, are getting results. It means free rolling while they compensate for shaft deflections, distortions or weave. It means low maintenance costs because the only attention SKF Bearings require is infrequent lubrication.

After all, *performance* in a bearing is the only thing that counts. To get it on *your* machines, see your nearest SKF representative; he will be glad to work with you. 4656

SKF
BALL & ROLLER BEARINGS

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.





HAUL *Heavier Loads at Higher Speeds* OVER WELDED TRACK!

● Operating speeds can be stepped up and heavier loads can be hauled when rails are Thermit welded. Elimination of rough riding, battered rail joints and transformation of rails into long, continuous ribbons of steel reduces danger of derailment; makes trains roll easier.

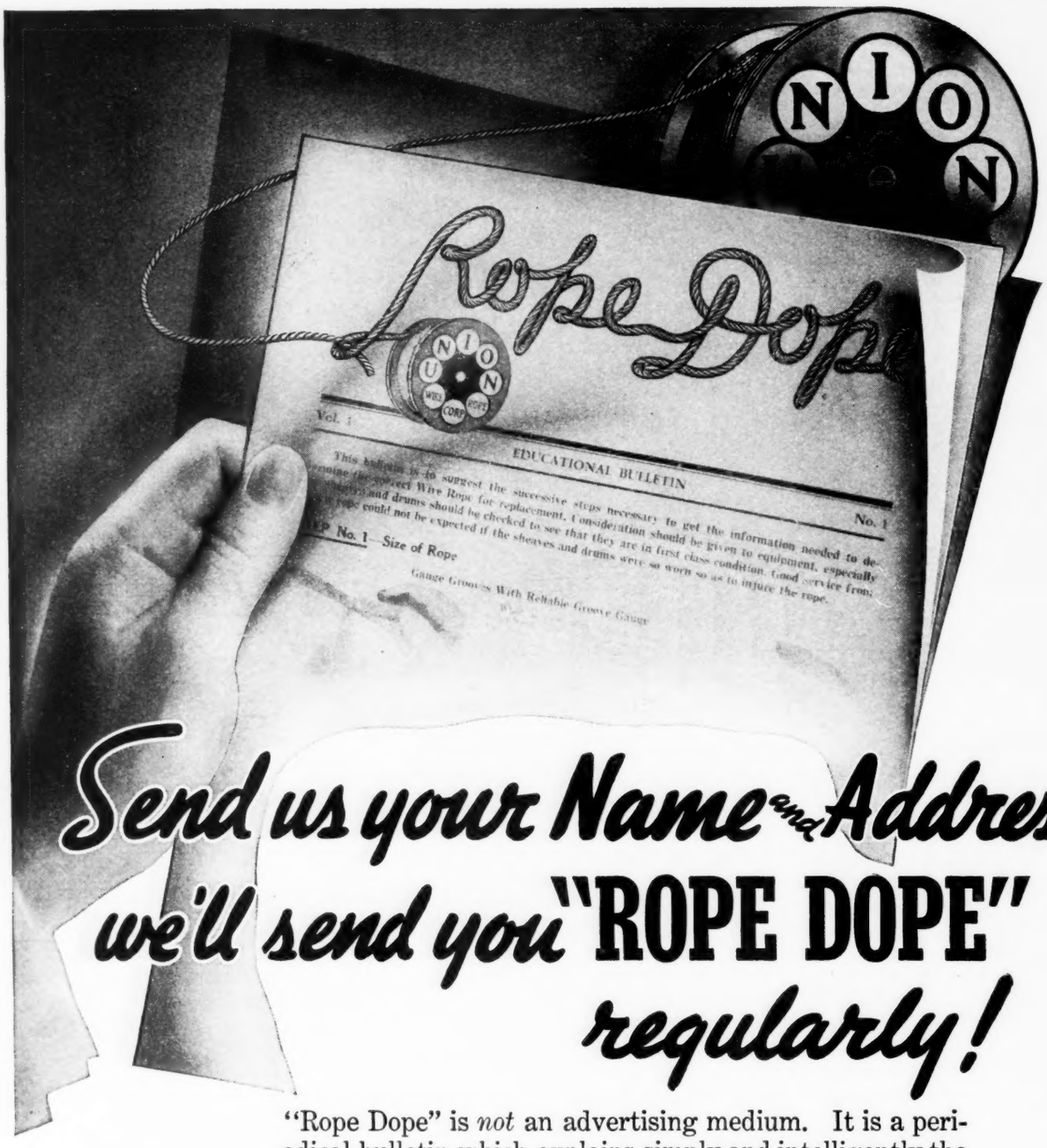
In addition, reduction of power losses, effected by doing away with rail bonds and substituting fully conductive welds, gives locomotives extra power.

Write for pamphlets outlining all of the savings you can make by installing welded main haulage track and describing the Thermit process of rail welding. Or, ask to have a representative call and explain. No obligation, of course.

THERMIT *Rail* WELDING

METAL & THERMIT CORPORATION • 120 BROADWAY, NEW YORK
ALBANY • CHICAGO • PITTSBURGH • SO. SAN FRANCISCO • TORONTO

For better results in electric arc welding, investigate MUREX line of HEAVY COATED ELECTRODES including especially designed rods for building up and hard surfacing.



Send us your Name and Address we'll send you "ROPE DOPE" regularly!

"Rope Dope" is *not* an advertising medium. It is a periodical bulletin which explains simply and intelligently the highly technical phases of Wire Rope—its applications and uses . . . There's no obligation on your part—but a lot of valuable information in store for you.

WIRE—WRITE—or consult your Telephone Directory

UNION Wire Ropes

"The ULTIMATE LOW COST WIRE ROPE"

UNION WIRE ROPE CORPORATION
General Offices and Factory:
2130 Manchester
Kansas City, Missouri

Distributors in Leading Cities throughout the Country.

3

Centrifugally Cast . . . Certainly! But of COPPER!

NO, FAIRBANKS-MORSE is not the only electric-motor builder who casts rotor and squirrel cage winding into one piece centrifugally.

But, only Fairbanks-Morse makes a centrifugally cast rotor with the winding of COPPER.

Of course it's more difficult. It took a great deal of time and money to learn how to perfect the means of production.

But it makes a better motor because copper makes a better winding.

Copper has better electrical conductivity. *Copper* has better thermal characteristics.

Hence, the Fairbanks-Morse Motor with centrifugally cast, *one-piece* COPPER rotor winding is more capable of withstanding constant plugging and reversing. It gives added years of trouble-free service.

If you use motors, *this* motor is worth your detailed investigation and, if you like—comparison.

Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois. Branches and service stations throughout the United States and Canada.

7780-EA40.154

Copperspun

FAIRBANKS·MORSE MOTORS

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS IRONERS STOKERS
PUMPS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

Keep the mine cars rolling

...with AIRCO welding and cutting apparatus and supplies

(Upper) Airco gas welding apparatus in use in a maintenance shop of the Pursglove Coal Mining Company, and (lower) in the car rebuilding shop at Jamison Coal and Coke Company's No. 8 mine.

SMOOTH track...sturdy cars...strong equipment . . . long life . . . low power consumption . . . all are necessary to keep the cars moving — to successfully operate a mine.

An Airco welding and cutting outfit is all that is needed to make practically every repair, either in the mine or in the shop. It can also be used economically to fabricate new equipment and many replacement parts for old equipment. When used with Airco High Purity Oxygen, Acetylene and time-proved methods, best results — at lowest cost — are assured.

Our Applied Engineering Department will gladly assist our customers in all problems involving the use of the oxyacetylene process in and around the mine. If you haven't received a copy of the new "Continuous Welded Rail" bulletin, ask any Airco office or representative for this interesting and helpful booklet.

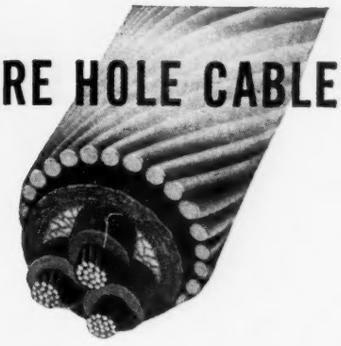
AIR REDUCTION

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.,**
DISTRICT OFFICES IN PRINCIPAL CITIES

AIRCO *Anything and Everything for* **GAS WELDING or CUTTING and ARC WELDING** WILSON

From Telephone Wire to

BORE HOLE CABLE



OVER 60 TYPES OF ROEBLING ELECTRICAL WIRES AND CABLES

Trolley Wire

Magnet Wire

Locomotive Reel Cable

Weatherproof Wire

Telephone Wire

Concentric and Two conductor Mining Machine Cable

Mine Entry Cable

Bore Hole and Shaft Cable

Rubber Covered Wires and Cables

And many other types for special purposes

QUICK SHIPMENT

Prompt Service is available at all offices and warehouse points listed below, where large stocks of a wide variety of standard Roebling Wires and Cables are always on hand. Your request for information, prices or samples will be welcomed.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N.J.

Atlanta, Boston, Chicago, Cleveland, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Seattle.

Export Dept., New York

IF IT'S ELECTRICAL WIRE OR CABLE **ROEBLING** HAS IT!

AUTOMATIC RECLOSING CIRCUIT BREAKERS SECTIONALIZE *Anthracite* MINES

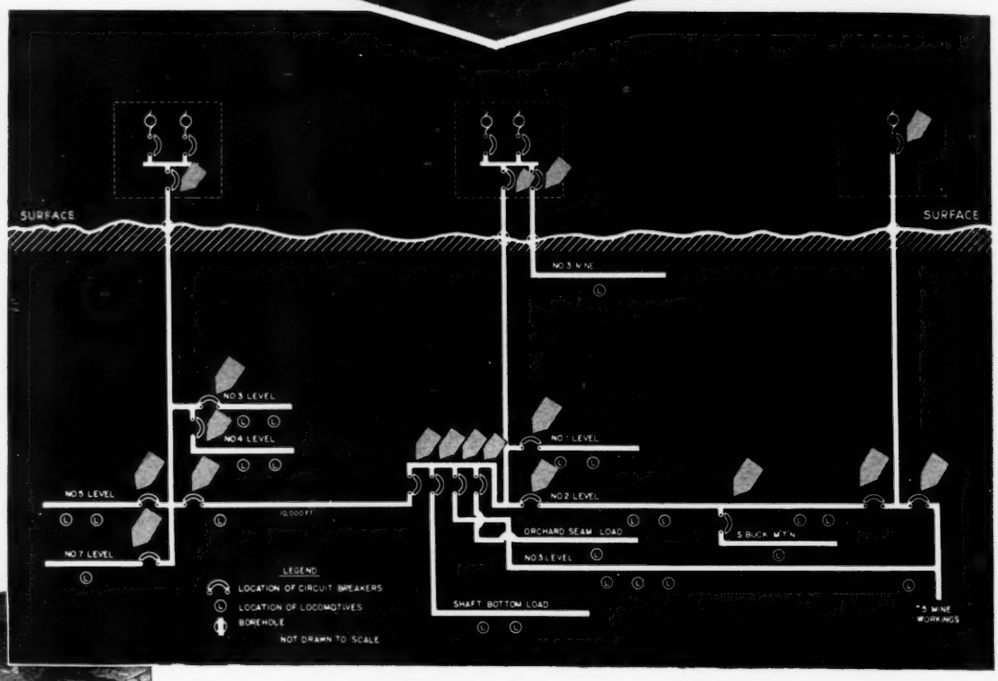
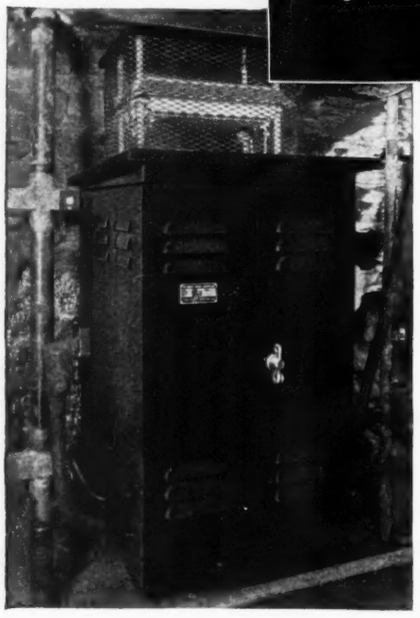


DIAGRAM showing location of sectionalizing circuit breakers on the surface and at various levels.



Typical anthracite installation showing a Type KSC circuit breaker protecting one mining level at a large colliery.

Increased use of sectionalizing circuit breakers has gone hand-in-hand with mechanization of the anthracite industry—just as it has with bituminous.

First proved in hand-loading mines, the values of sectionalizing with automatic reclosing circuit breakers are even more pronounced in mechanized operations.

The advantages of sectionalizing are:

INCREASED PRODUCTION

Electrical disturbances are confined to the levels in which they arise, thereby giving better continuity in production schedules.

REDUCED HAZARDS

Risks of fires and explosions are greatly reduced since the protecting circuit breaker on each level is adjusted to the load conditions of that level.

LOWERED MAINTENANCE

Abusive operation of mining and haulage equipment under serious overload or on low voltage is prevented.

POWER ECONOMY

Less total energy is consumed and costly peaks are avoided.

The clinching reason in all decisions to sectionalize is the low cost of automatic reclosing circuit breakers in relation to the money-value of the equipment and the production schedules they protect.

Catalog 2501, just off the press, deals entirely with electrical protective apparatus for mining operations. A copy for the asking.

I-T-E

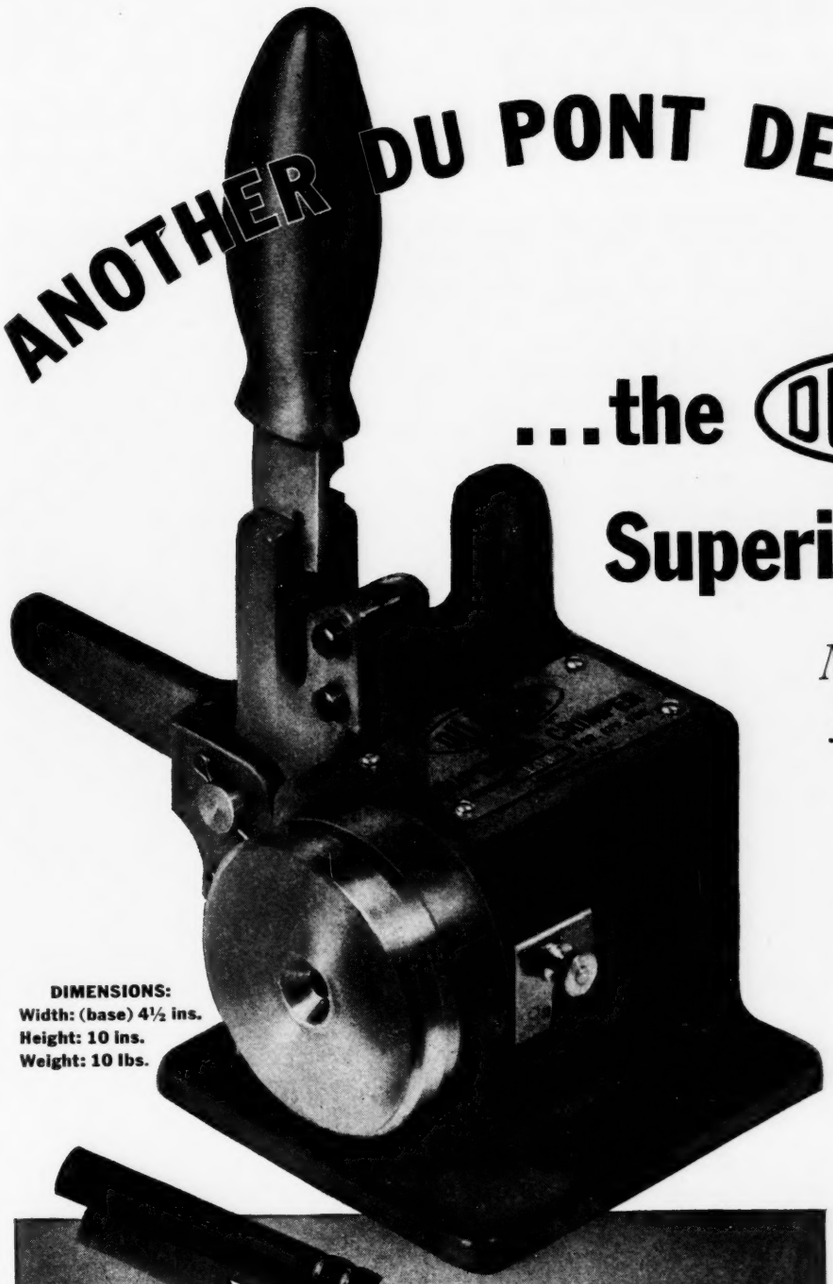
Representatives in Principal Mining Areas

I·T·E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

ANOTHER DU PONT DEVELOPMENT

...the DU PONT Superior Crimper

REG. U. S. PAT. OFF.



DIMENSIONS:
Width: (base) 4½ ins.
Height: 10 ins.
Weight: 10 lbs.

Makes a WATERPROOF joint between blasting cap and fuse!

The Du Pont Superior Crimper is a new bench-type cap crimper recently developed by Du Pont Engineers.

The crimp made by the Superior Crimper is not like the sleeve or segment type. It consists of two smooth continuous internal beads on the throat of the cap. These beads grasp the covering of the fuse so closely that a waterproof seal is made without the use of a waterproofing compound. Practical tests have demonstrated that the Du Pont Superior Crimper makes a joint more waterproof than the fuse itself.

In operation, the Du Pont Superior Crimper is mounted on a bench. The freshly cut end of fuse is inserted in the cap as far as possible, and then pushed into throat of crimper until it stops. Operating the handle once makes the two crimps as shown.

The Du Pont Superior Crimper works either by foot treadle or hand. The crimper is adjustable to crimp any length of commercial cap, and is equipped with a fuse cutter.

This new crimper is still *another* example of Du Pont pioneering and leadership—to help you conduct your blasting with greatest possible efficiency and economy. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington, Delaware.

DU PONT REG. U.S. PAT. OFF. **EXPLOSIVES** *and* **BLASTING ACCESSORIES**

MECHANIZED PRODUCTION demands the greater strength and economy of STEEL

TODAY, mining is turning increasingly to steel for ties, timbers and all operations where strength and durability are demanded. No other material is as adaptable to modern production methods.

Heavy machinery must be kept mobile. Equipment must be operated at full capacity—which means wider cuts at the face, faster loading, bigger cars. All this calls for greater strength overhead and under the wheels—and you can rely on steel to do the job safely, and with low maintenance costs.

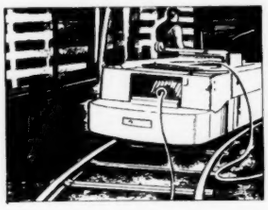
Steel's first cost is almost the only cost. Long lasting, permanent where wanted, it can be re-used time after time.

Carnegie-Illinois has the right steel for every mine use — immediately available. Why not consult a Carnegie-Illinois engineer on your next problem? He will be glad to help you.

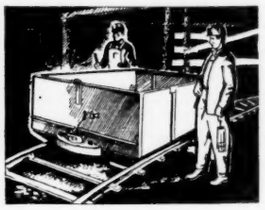
USE STEEL FOR SAFETY

WHERE STEEL SAVES YOU MONEY

U·S·S Steel Room Timbers *pay for themselves by increasing production efficiency. Their longer spans allow a wider room so that expensive cutting machines can be operated at full capacity. They are safe too—will bend but not break.*



U·S·S Steel Ties *assure safe movement of heavy equipment. Derailments are substantially reduced, as the track is held in permanent alignment. They are easily laid with few tools, and may be moved from room to room in whole sections.*



U·S·S Cor-Ten and Man-Ten *are ideal for mine car construction where increased strength and reduced weight are all important. Where abrasive conditions are exceptionally severe* U·S·S Abrasion Resisting Steel *gives longer service.*

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

New Market Demands

SMALLER SIZES • STOKER COAL

JEFFREY SLOW SPEED FLEX TOOTH CRUSHERS

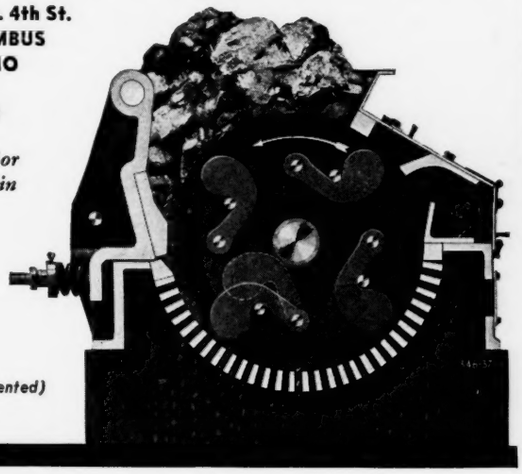
● Will reduce lump, egg, nut, run-of-mine, to 1″ and smaller sizes—one operation—minimum fines.

THE JEFFREY MANUFACTURING CO.

912-99 No. 4th St.
COLUMBUS
OHIO

●

Send for Bulletin



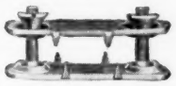
(Patented)

Keep your conveyor belts going with FLEXCO

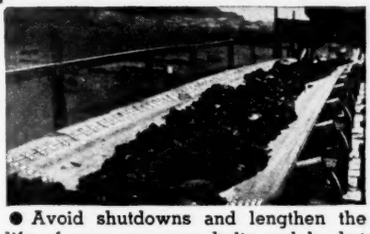
TRADE MARK

HD BELT FASTENERS

• FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.



• FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.



● Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy

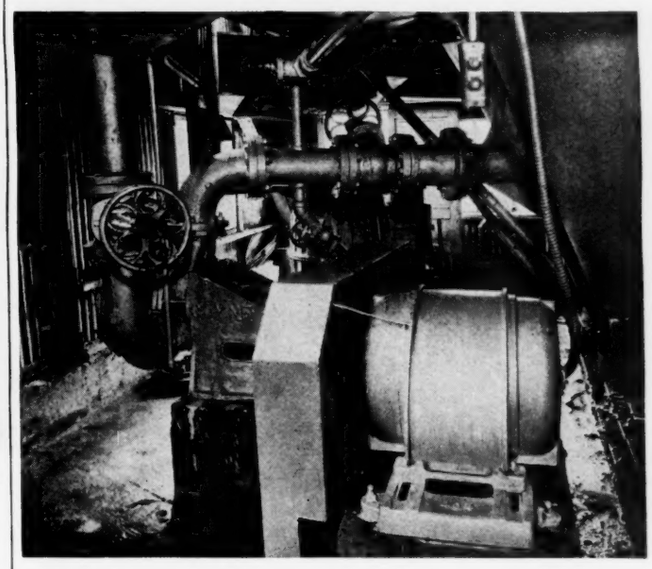
FLEXIBLE STEEL LACING COMPANY
4638 Lexington St., Chicago

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

Consider the Facts

Industrial Planning constitutes in part the selection and application of proper equipment for a specific duty.

Illustrated below is what we consider an example of sound industrial planning. The picture shows an installation which exceeded expectations and resulted in a duplicate order for the second washery installed by our customer.



The service was handling sand and water mixtures in a modern preparation plant.

The requirements were economy of operation in every respect.

The customer recognized the following facts:

1. **The internal wearing parts of the pump should be readily removed for inspection or repairs.**
2. **The pump should be easily adjustable to compensate for wear and maintain capacity.**
3. **Some efficient means must be provided to change pump capacity. Throttling by means of valves must be avoided.**

Accordingly a Goyne Type 1609 Sludge Pump with a Variable Speed Drive was selected and found to be entirely satisfactory.

Consider these facts before you purchase your next washery pump.

All inquiries receive prompt and careful attention.

THE GOYNE STEAM PUMP CO.

ASHLAND, PA.

Dustless Coal Treatment Specification

A. The treatment must be fully effective from the time the coal is treated until it is burned.

B. The treatment must have no harmful effect on persons, clothing or equipment. It must be free of occupational hazard and free from explosive or fire hazard when stored or used.

C. The treatment must be odorless, practically colorless when spread in a thin film and must not stain nor discolor clothing or equipment.

D. The treatment must be free from danger of flash back when the coal is burned and must not create any obnoxious gases when the coal is stored or burned.

E. The treating material must not freeze nor clog spraying equipment at low temperatures. It must be easily sprayable at any temperature, either low or high.

F. The treatment must retard the formation of ice on the coal to sub-zero temperatures.

G. The treatment must not effect the appearance of the coal, its combustion value nor the fusion point of the ash.

H. The treatment must improve the storing qualities of the coal and must have the ability to recoat by contact.

I. The treatment shall not make any fire or explosive hazard when sprayed.

J. The treatment must be harmless to metals or rubber belting.

COAL-HEAT (May, 1940) publishes the requirements for

FREEZEPROOF · DUSTLESS COAL TREATMENT

CALCIUM CHLORIDE

FULFILLS ALL THESE REQUIREMENTS!

Write for literature and technical information on dust-proofing and freezeproofing coal, to any of these members of the Calcium Chloride Association

THE COLUMBIA ALKALI CORP.
30 Rockefeller Plaza, New York City

MICHIGAN ALKALI COMPANY
60 E. 42nd St., New York City

THE DOW CHEMICAL COMPANY
Midland, Michigan

SOLVAY SALES CORPORATION
40 Rector St., New York City

The greatest help a coal mining man can have—

IF YOU want to make sure of getting your certificate of competency—sure of winning a bigger job with bigger pay, get Beard's great books today and put them to work for you.
In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's
Mine Examination Questions and Answers!

3 volumes — $7.50, payable in four monthly payments

THESE books explain what a man must know in order to become a mine inspector, a mine foreman, assistant foreman, fireboss, hoisting engineer, safety engineer, shot-firer, etc.

They give you complete and authoritative information about air and gases, explosives, safety requirements and methods, mechanics, engines, hoisting, drainage, pumping, ventilation, timbering, instruments, and every other detail that the practical mining man must know.

Can you answer these questions—

What is meant by splitting the air current and what are the advantages derived from such methods?

Can a miner live in air in which the oxygen content is reduced to 17 per cent?

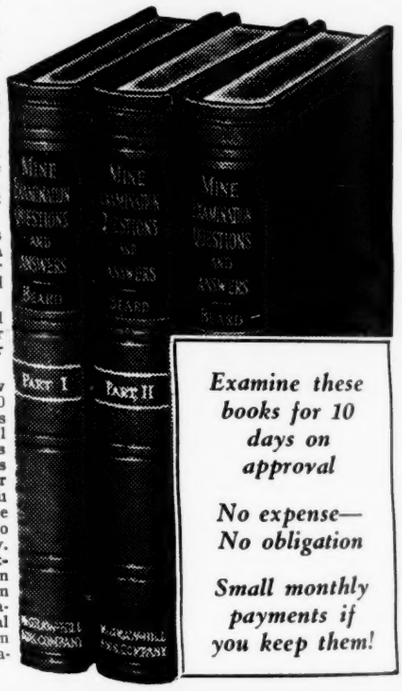
Name five duties imposed on mine foremen by law?

In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

What are the advantages and disadvantages of a gasoline pump, an air pump and an electrical pump?

What is the estimated tonnage per acre, per foot of thickness, for bituminous coal?

These are but a few of the more than 2000 questions given in Beard's books together with full correct answers. Hundreds of men have used this method to prepare for higher, better jobs. You can too, if you have the Beard books and plan to use them systematically. They are the best investment that a mining man can make—not only as an aid for passing examinations but as practical reference volumes on everyday mining operation problems.



Examine these books for 10 days on approval

No expense— No obligation

Small monthly payments if you keep them!

McGRAW-HILL ON-APPROVAL COUPON

McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York

Send me, charges prepaid, **Beard's Mine Examination Questions and Answers,** 3 volumes, for 10 days' examination. If satisfactory I will pay $7.50 at the rate of $1.50 in ten days and $2.00 per month. If not wanted I will return the three volumes postpaid.

Signature .....

Address .....

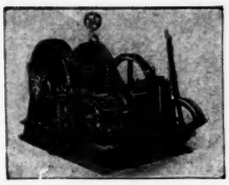
City and State .....

Company .....

Position ..... C. 12-40

(To insure prompt shipment write plainly and fill in all lines)

FLORY HOISTS



Manufacturers of Steam, Electric and Gasoline Hoists of all types; also parts for all model Flory Hoists.

FLORY MANUFACTURING CO.
BANGOR, PENNSYLVANIA

HENDRICK

Carbondale **1600**

for

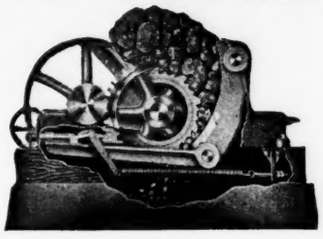
PERFORATED PLATE

Round—Square—Diagonal—Slot
Any perforation

HENDRICK MANUFACTURING CO.
41 DUNDAFF ST., CARBONDALE, PA.

Sales Offices in Principal Cities.
Please Consult Telephone Directory.

COAL CRUSHERS



We build a type and size for every coal crushing requirement. 100 years of experience is your assurance that we know how. Quotations on request.

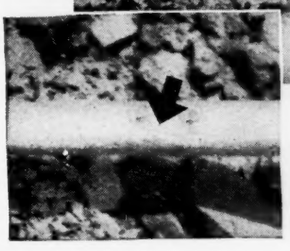
McLANAHAN & STONE CORP.
Established 1835 HOLIDAYSBURG, PENNA.

PERFORATED METAL
COAL MINING SCREENS
Manufactured exactly to your specifications
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.

CHICAGO PERFORATING CO.
2443 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

After 3 years' service —only slightly nicked

IT'S TELLURIUM CABLE



Above—down the hill, over the rocks, and into the muck

At left—you can just barely see the nicks on either side of the arrow

THIS tells about a three-conductor No. 00 Awg tellurium-rubber portable cable that supplies power to an electric shovel on a coal-stripping operation.

You can see from the pictures that the service is severe. Yet, when examined after more than three years of use, the cable had only a few nicks, the worst of which are shown in the small illustration.

From this you may assume that the cable is tough and does stand rough usage. We're sure of that. We're sure that each type is built right for its particular service—for shovel or dredge, coal cutter, loader, or "motor," drill, or arc welder. Get the right type for each equipment. See your G-E jobber, or call on a G-E cable specialist if you desire help on any technical problem. Address the nearest G-E sales office or General Electric Company, Schenectady, N. Y.

Another view showing why such portable cable must be tough

GENERAL ELECTRIC

THE PURE

THE PURE OIL COMPANY, U.S.A.

PURE

A Pure Oil engineer will help solve your lubrication problems. Write today.

PURE THREE POINT LUBRICATION • A Complete Line of Industrial Petroleum Products

OIL CO.

CHICAGO, U.S.A.

WOOD PIPE for Mine Drainage

Wyckoff Wood Pipe has an 85 year record of perfect resistance to the corrosive action of sulphurous mine water. It is an ideal, long-time investment—light, easy to lay, and relatively low in first cost

We also manufacture a special Hard Maple Pipe for flushing culm and wood covering for underground steam lines.

shipments from stock day after receipt of order. Send for catalog.

Established 1855

Emergency orders can be delivered by Truck to Mines in Pennsylvania Coal Fields following morning after receipt of same.

A. WYCKOFF & SON CO.
Office and Factory
Home & Junction Streets, Elmira, N. Y.
The Originators of Machine Made Wood Pipe

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word, minimum charge $2.00.

(See ¶ on box Numbers.)

Positions Wanted (full or part-time salaried employment only), one-half the above rates.

Proposals, 50 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising rate is $5.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page. C.A.

NEW ADVERTISEMENTS received by 10 A. M. December 19th will appear in the January issue, subject to limitations of space available.

POSITIONS WANTED

GRADUATE IN CIVIL ENGINEERING. 15 years Coal Mining experience. 5 years at a Mechanical Mine. Desires position as Engineer or Assistant. PW-547, Coal Age, 330 W. 42nd St., New York, N. Y.

GRADUATE MINING ENGINEER, fifteen years experience in coal mining, desires position as superintendent or engineer. PW-554, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

ELECTRICAL AND MECHANICAL ENGINEER, college graduate with excellent record during years of practical experience. At present employed. Good reasons for desiring change. PW-555, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

MINE SUPERINTENDENT, graduate engineer with lifetime experience. At present employed, but desires change. Background worth investigating. PW-556, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

FOR SALE

APRON TYPE combination picking table (12' long) and loading boom (30' long.) Will sell or trade for underground shaking conveyor. FS-557, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

DIAMOND CORE DRILLING, for any mineral. More than fifty gasoline, steam and electric drills, suitable for any job. **OUR SPECIALTY,—testing bituminous coal lands.** Satisfactory cores guaranteed. Prices very reasonable.

LEON H. HOFFMAN, *Pres.*
HOFFMAN BROS. DRILLING CO.
PUNXSUTAWNEY, PA. Est. 1902 Tel. 382

Equipment For Sale Advertising Pages 145, 146 & 147

Equipment Wanted Advertising Page 146

BARGAINS FOR SALE

ROTARY CONVERTERS

1—300 KW G. E. Rotary Converter, type HCC-6, form P, 1200 RPM, 250/275 volt DC with switchboards and all necessary switchboards and switchgear, including transformers for 2300/4000 volt.

SHORTWALL MACHINES

4—Practically new 512-DA Goodman Universal Shortwall Machines, purchased new in 1938, used only a few weeks, 250 volt DC, 7½′ cutter bars, on tip-turn trucks, cable reel and 300′ of new cable.
5—112-AA Goodman Universal Shortwall Machines, 250 volt DC.
7—12-AA Goodman Standard Shortwall Machines, 250 volt DC.
3—Jeffrey 35-B Shortwall Machines, 250 volt DC on self-propelled trucks and cable reel and cable.

MOTOR GENERATOR SETS

2—200 KW G. E. M. G. Sets, 250/275 volt DC, 1200 RPM, 3 phase, 60 cycle, 2300/4000 volt AC, .8 P.F., switchboards and all necessary switchgear and Automatic Reclosing Circuit Breaker for the DC end. Guaranteed 100% against electrical and mechanical defects.

LOADING MACHINES

5—7 BU, 2—8 BU Joy Loaders.
7—#4, 3—#4 Myers-Whaley Loaders

LOCOMOTIVES

2—17-ton Jeffrey type MH-77 motors
2—17-ton Goodman type 36-A motors
4—15-ton Jeffrey type MH-110 motors.
7—15-ton Goodman type 36-A motors
4—13-ton Goodman type 36-B motors
2—13-ton G. E. type HM-827 motors
1—13-ton Westinghouse type 908 motors
3—10-ton Goodman type 34-B motors

LOCOMOTIVES (Continued)

3—10-ton Jeffrey type MH-110 motors
3—8-ton Goodman type 32-0 motors
5—8-ton Jeffrey type MH-100 motors
5—6-ton G. E. type HM-823 motors
10—6-ton Jeffrey type MH-88 motors

We also have (1) 30-ton General Electric with 125 H.P., HM-823, 250 volt ball bearing motors, contactor control, steel strip resistance, 42″ gauge. Equal to new.

WANTED

Will pay good cash prices for 300 and 500 KW Motor Generator Sets and Rotary Converters, 250/275 volt DC, 2300/4000 and 6600 volt AC. 13, 15 and 20-ton Locomotives, 250 and 500 volt DC.

WE SPECIALIZE IN BUYING COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

Our Financial Responsibility is Your Guaranatee of Satisfaction

COAL MINE EQUIPMENT SALES COMPANY

WE BUY AND SELL USED AND REBUILT MINE EQUIPMENT

OFFICES AND WAREHOUSE — TERRE HAUTE, INDIANA

ELECTRIC LOCOMOTIVES

1—15 ton Jeffrey, with MH-110 motors
1—13 ton Jeffrey, with MH-110 motors
1—10 ton Jeffrey, with MH-110 motors
1— 6 ton Jeffrey, with MH- 88 motors
1— 4 ton Jeffrey, with MH- 96 motors

MINING MACHINES

3—212G3 Goodman Lowvein AC
4—12AB Goodman DC
2—112AA Goodman DC
4—35B Jeffrey 250 volt DC
1—35B Jeffrey 500 volt DC
1—36B Jeffrey Shortwall Lowvein 250 V. DC
2—56A Jeffrey 250 V. Permissible Drills
1—35 BB Jeffrey AC

SUBSTATION

1—500 KW Ridgway MG Set, 275 volt
1—200 KW West. 275 V. Rotary Converter
2—150 KW G.E. MG Sets, 250 volt
1—100 KW MG Set

We have other equipment

TIPPINS MACHINERY CO.

3528 Forbes St. Pittsburgh, Pa.

MINE RAILS

Guaranteed Practically Equal to New Super Quality Machine Reconditioned—not ordinary Relayers.

Standard Modern Section and Drilling
6,000 ton—20 lb. to 40 lb.
10,000 ton—45 lb. to 130 lb.

Priced at $200 to $500 per carload less than cost of New Rails. Less carload—in proportion.

Fully Guaranteed — shipped anywhere — subject inspection and approval at your Mine.

NEW RAILS, FROGS & SWITCHES, SPLICE BARS, TIE PLATES, BOLTS, NUTS, SPIKES, GAUGE RODS, OTHER ACCESSORIES

Shipment from stock. Phone, write, or wire for quotation.

L. B. FOSTER CO.

PITTSBURGH - CHICAGO - NEW YORK

D. C. MOTORS

230 Volts D. C.—Westinghouse

Qu.	Hp.	Make	Type	Speed
11	2	Westinghouse	CD 923	1725
9	2	Westinghouse	CD 925	1180
19	2	Westinghouse	SK 20	850
14	2	Westinghouse	SK 23	850
41	3	Westinghouse	CD 925	1725
211	3	Westinghouse	SK 20	1150
51	3.5	Westinghouse	SK 33	850
17	5	Westinghouse	SK 23	1750
196	5	Westinghouse	SK 30	1150
79	5	Westinghouse	SK 33	1150
61	5	Westinghouse	SK 40	850
36	7.5	Westinghouse	SK 33	1750
56	7.5	Westinghouse	SK 40	1150
36	7.5	Westinghouse	SK 43	1150
21	7.5	Westinghouse	SK 60	850
17	7.5	Westinghouse	SK 63	850
16	10	Westinghouse	SK 40	1750
17	10	Westinghouse	SK 60	1150
43	10	Westinghouse	SK 63	1150
31	10	Westinghouse	SK 80	850
19	10	Westinghouse	SK 83	850
4	15	Westinghouse	SK 63	1750
11	15	Westinghouse	SK 80	1150
9	15	Westinghouse	SK 83	1150
17	15	Westinghouse	SK 93	850
7	15	Westinghouse	SK 90	850
23	20	Westinghouse	SK 80	1750
11	20	Westinghouse	SK 83	1750
4	20	Westinghouse	SK 110L	750
3	25	Westinghouse	SK 100L	1150
9	25	Westinghouse	SK 103	1150
16	25	Westinghouse	SK 103	1150
7	25	Westinghouse	SK 120	850
4	25	Westinghouse	SK 113	850
1	30	Westinghouse	SK 120BB	975
3	30	Westinghouse	SK 113	1150

PENN ELECTRICAL ENGINEERING COMPANY

SCRANTON, PA.

CONVERSION EQUIPMENT HEADQUARTERS

2—Mercury Arc Rectifiers; 380 KW at 275 volts DC or 850 KW at 600 volts DC. Fine units

Rotary Converters

2—100 KW., 250/275 volts DC, G.E. type TCC
1—150 KW., 250/275 volts DC, G.E. type HCC
1—200 KW., 250/275 volts DC, Ridgway (new)
1—200 KW., 550/600 volts DC, G.E. type HCC
2—300 KW., 550/600 volts DC, G.E. type HCC

Also transformers and switchboards for above

R. H. BENNEY EQUIPMENT CO.

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Steel STORAGE TANKS

Railway Tank Car Tanks

Mfrs. pressure 60#. Underwriters' certificates furnished.

DELIVERED, and anytime, YOUR FOUNDATIONS, if desired!

6,000 to 10,000 gallons. Piped or non-piped.

A much better "buy" than new (lighter) tanks assured

Whole tank cars too. Would "portable" storage be cheaper and more advantageous for your particular needs? Just get our prices on both tanks and cars before you buy elsewhere.

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Cars and Locomotives; all types—Car Parts—Machinery & Equip.—Etc.

"Anything containing IRON or STEEL"

PUMP MOTORS

230 volts D.C.

HP			RPM
1—150	WECo	SK	1750
1—100	WECo	SK	1750
2— 50	GECo	CD	1750
1— 15	GECo	RC	1700
2— 10	WECo	SK	1700
1— 7½	WECo	SK	1700
2— 5	GECo	CD	1750
1— 5	WECo	SK	1750
2— 5	GECo	RC	1150
14— 5	WECo	SK	1150
2— 4	WECo	S	1175
1— 3	CWCo	CH	1750
1— 3	GECo	CD	1150
5— 3	WECo	SK	1150

MOTOR GENERATOR SETS

GENERATORS—275 V.—D.C. SYNCH. MOTORS 3/60/2300 V.—A.C.—1200 R.P.M.
2—300KW GECo 1—200KW GECo 1—150KW GECo

CRUSHER

1—30 x 30 Jeffrey single roll with quick roll adjust.

CONVEYOR

1—350 Ft. 42″ W. belt conveyor complete with steel trusses, etc.

SQ. CAGE

HP		RPM
1—200	GECo KT	1800
1—200	GECo KT	1200
2—150	WECo CS	720
2—100	GECo KT	720
1—100	GECo KT	1800
1— 75	EDCo BK6/1200	
1— 75	WECo CS	720
1— 50	ACCo AR	3600
1— 50	GECo KT	1800
1— 50	GECo KT	1200

SLIP RING

HP		RPM
1—450	WECo CW	500
1—200	WECo CW	600
2—200	GECo IM	600
1—150	WECo CW	720
1—100	GECo MT	900
1— 82	GECo ITC	490
1— 75	WECo CI	900
1— 75	WECo CW	900
1— 52	GECo ITC	900
1— 40	ACCo ANY	900

Many others—Write for list

ROTARY

1—150 kw. Westgh. 275 V D.C. with trans. & swbds

COMPRESSORS

3—Type 20 Ing.-Rand Portable Mine Car Units, 100 CFM, with AC or DC Motors.

TRANSFORMERS

Single Phase—60 Cycle

KVA		
3—200	GECo	2200—220/440
2—100	ACCo	2300—230/460
2—100	PGH	2200—220/440
2—100	GECo	2300—230/460
2—100	GECo	2200—110/220
1—100	ACCo	2300—115/230
3— 75	GECo	4000—220/440
3— 75	GECo	2200—220/440
3— 50	GECo	2200—110/220
3-37½	WECo	2200—220/440
3— 25	GECo	2200—220/440
1— 25	GECo	440—110/220
4— 15	WECo	2200—110/220
3— 15	WECo	2200—220/440

LOCOMOTIVES COMPRESSORS HOISTS TIPPLES MINING MACHINES

FOR DETAILS, WRITE: JOHN D. CRAWBUCK CO. 406-7 EMPIRE BLDG. PITTSBURGH, PENNA.

GOOD REBUILT EQUIPMENT

LOCOMOTIVES

Jeffrey: 10 ton, 500 volt, 44" gauge, 8 ton, 6 ton, and 4 ton, all gauges, 250 volt.

Goodman: All 250 volts,
2— 6 ton, 33-I-4T, 44"
1— 6 ton, 30B, 48" 1— 5 ton, 41-I-4T, 48"
1— 5 ton, W-I-2, 36".

Westinghouse: All 250 volt,
3— 6 ton, 904C, 44", as is
1— 4 ton, 902, 48" 1—13 ton, 102, 44"

G.E.: All 250 volt, 6 ton 823, 44"
6 ton 803, 44", as is 4 ton 1022, 44", as is
Ironton Battery Locomotive, 4 ton, 44". Edison batteries.

MINING MACHINES

Jeffrey, 35B, 29B, and 4—28A, 250 volt.
Goodman, 12A, 13AB, 12AA, 124AA, 12G3A.
1—212AA, 250 volt and 2—112DA, 500 volt. 11—Permissible Type 12CA.
Sullivan, CE7, CE9, CE10 and Shearing Machine.
1—Coal Crusher, Jeffrey 24"x24", Single Roll.

SUB STATIONS
275 volts, D.C.
1—200 KW **West.** Rotary Converters.
2—200 KW **G.E.** Rotary Converters.
1—150 KW **West.** M-G Set.
2—150 KW **Ridgeway** M-G Sets.
2—100 KW **Ridgeway** M-G Sets.
1— 50 KW **G.E.** M-G Set.

HOISTS
to 100 HP
3—Cableway Hoists, double drum.
1—Conveyor Hoist, 25' per minute.

AERIAL TRAMWAY * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE COMPRESSORS * CAR RETARDERS CAR STOPS * DUMPS * SPEED REDUCERS * FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVEL * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Goosenock), 29B and 29C * COAL DRILLS * MINING MACHINE TRUCKS * SWITCH-BOARDS * CIRCUIT BREAKERS—AC & DC * CUTTER CHAINS—Jeffrey, Sullivan, Cincinnati, and Bowdil. BIT SHARPENER * TRUCK SCALES CONVEYOR HOIST * VIBRATING SCREENS * SHAKER SCREENS.

GUYAN MACHINERY COMPANY Logan, W. Va.

Electrical Equipment Rebuilt & Guaranteed

for immediate shipment

SQUIRREL CAGE MOTORS
60 Cycle—3 Phase

Quantity	HP	Speed	Make	Type
1	350	600	G.E.	IK-17B
3	400	1750	West.	CS-935.6H
1	400	1180	G.E.	KT-565
1	600	1175	G.E.	KT-569

SLIP RING MOTORS
60 Cycle—3 Phase

1	500	580	West.	CW
2	500	435	G.E.	MT-412
2	600	505	West.	CW-1314
2	700	393	G.E.	MT-432

230 VOLT D.C. CONSTANT SPEED MOTORS

1	200	850	G.E.	CD-165A
1	250	1150	C.W.	CMC-101A
1	260	720	West.	SK
1	410	1200	West.	

230 VOLT D.C. ADJUSTABLE SPEED MOTORS

3	100	320/960	West.	SK-200
3	125	450/1000	West.	SK-193
4	150	320/850	West.	SK-210
6	250	275/900	West.	QM

250 VOLT SYNCHRONOUS MOTOR GENERATOR SETS
3 Phase—60 Cycle
2 — 1500 KW, 250 volt Westinghouse, 514 RPM, Synchronous M-G Sets.

The items listed here are but a very small part of our complete stock of rebuilt electrical equipment. Please write or wire for further details.

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FOR SALE

Locomotives—Mining Machines
Pumps—Motors — Transformers
Steel Tipples — Rescreeners
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Compressors — Loading Booms
Engines — Generators — Scales
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Our own modern machine shop is available to repair and modernize your equipment.

Complete Mines dismantled and sold.

HAIR EQUIPMENT COMPANY
Office and Warehouse
Reed and Election Streets
BENTON, ILLINOIS

-TRANSFORMERS-

A Complete Stock **Prompt Shipment**

3—500 KVA Wagner Transformers, 60 cycle, 4000–460 volts **$935.00** Each

We Rewind, Repair and Redesign all Makes and Sizes
ALL TRANSFORMERS GUARANTEED FOR ONE YEAR
Write for Catalog No. 135-B

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"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
STATION M **Since 1912** **CINCINNATI, OHIO**

RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton—18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

Bradford Supply Company, Inc

OIL WELL
GAS WELL
WATER WELL
MINE

PIPE
• NEW • USED • RECONDITIONED •

IRRIGATION
CONSTRUCTION
QUARRY
FABRICATING

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High Grade Maintenance Machine Tools

Lathes, Shapers, Milling Machines, Hydraulic Presses, Hack saws, every type of tool for the maintenance shop. Write for catalogue.

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OIL SWITCHES
AIR CIRCUIT BREAKERS
SAFETY SWITCHES
Bought—Sold
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SHORTWALL MINING MACHINE

One Goodman Shortwall 512 Mining Machine, 7½ foot Cutter Bar, 3½" Kerf, DC 250 volts, Height 22", length, exclusive of bar, 64", Width 49". In A1 condition. Subject to inspection and prior sale.

Tennessee Consolidated Coal Co.
Tracy City, Tenn.

WANTED TO BUY
COAL BRIQUETTING PLANT
About 30 tons per hour, complete with auxiliaries.

Please state capacity, make, age, location and approximate price in first letter.

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CONVEYOR BELT

2550' CONVEYOR BELT—26" wide, 4-ply 42 oz. duck, 16/19# friction, 1400/2000# Tensile, 1/8" top cover including breaker strip, 1/32" bottom cover. This belt is new —still at factory. Very attractive price. Write

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WANTED TO BUY:
SHAKER CONVEYOR
One or more used G-12½ Goodman Shaker Conveyor. Duckbill.

W-548, Coal Age
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For COAL MINING — LOCOMOTIVES *and* SUB-STATIONS . . .

OWNED BY US AND AVAILABLE FOR IMMEDIATE SHIPMENT!

MOTOR GENERATORS

750 KW WESTINGHOUSE SYN. 275 V. 2300/4000 V. 3 Ph., 60 Cy., 80% P. F., 900 RPM.
600 KW GEN. ELEC. SYN. 275 V. 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 900 RPM.
500 KW GEN. ELEC. SYN. 275 V. 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 900 RPM.
360 KW GEN. ELEC. SYN. 275 V. 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 1200 RPM.
300 KW GEN. ELEC. SYN. 275 V. 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 1200 RPM.
300 KW WESTINGHOUSE, SYN. 275 V. 2300/4000 V. 3 Ph., 60 Cy., 80% P.F., 1200 RPM.
200 KW GEN. ELEC. SYN. 275 V. 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 1200 RPM.
150 KW WESTINGHOUSE SYN. 275 V. 2300/4000 V. 3 Ph. 60 Cy. 80% P.F., 1200 RPM

LOCOMOTIVES

20-Ton WESTGHE, 550 V. 909 Mts. 44"-36" Ga.
15-Ton WESTGHE, 250 V. 909-C Mts. 48"-36" Ga.
13-Ton JEFFREY, 250 V. MH-110 Mts. 44"-36" Ga.
10-Ton WESTGHE, 250 V. 907-C Mts. 42"-36" Ga.
10-Ton JEFFREY, 250 V. MH-110 Mts. 44"-36" Ga.
10-Ton GOODMAN, 250 V. 29-A Mts. 36" Ga.
8-Ton JEFFREY, 250 V. MH-100 Mts. 48"-36" Ga.
8-Ton JEFFREY, 500 V. MH-100 Mts. 48"-36" Ga.
6-Ton JEFFREY, 250 V. MH-88 Mts. 44"-36" Ga.
6-Ton WESTGHE, 250 V. 904-C Mts. 48"-42" Ga.
6-Ton WESTGHE, 500 V. 904-B Mts. 44"-36" Ga.
4-Ton WESTGHE, 250 V. 902-C Mts. 36" Ga.
4-Ton GOODMAN, 250 V. 42-A Mts. 42"-36" Ga.

ROTARY CONVERTERS

500 KW GENERAL ELECTRIC SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM. Form P.
300 KW GENERAL ELECTRIC SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM. Form P.
300 KW GENERAL ELECTRIC SYN. 600 V. HCC, 6 Ph., 60 Cy., 1200 RPM. Form P.
300 KW ALLIS-CHALMERS SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM. Pedestal Type.
200 KW GENERAL ELECTRIC SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM. Form P.
200 KW WESTINGHOUSE SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM. Bracket Type.
150 KW GENERAL ELECTRIC SYN. 275 V. HCC. 6 Ph. 60 Cy. 1200 RPM. Form P.

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WALLACE E. KIRK COMPANY

501 GRANT BLDG. INCORPORATED PITTSBURGH, PA.

MINE HOISTS

1—**Diamond** Band Friction 18" diameter with 35 H.P. electrical equipment.
1—**Vulcan** 24" diameter with 50 H.P. electrical equipment.
1—**Thomas** 24" diameter with 90 H.P. electrical equipment.
1—**Flory** 30" diameter complete with 60 H.P. electrical equipment.
1—**Vulcan** 30" diameter with 75 H.P. electrical equipment.
1—**Vulcan** Friction Drum 54" diameter with 125 H.P. electrical equipment.
1—**Vulcan** Double Drum Electric Shaft Hoist with 75 H.P. electrical equipment.
1—**Lidgerwood** Electric Shaft Hoist 50" drum, 150 H.P., 2200 volt electrical equipment.
1—**Vulcan** Shaft Hoist Single Drum 72" drum, 150 H.P., 2200 volt electrical equipment.
1—**Vulcan** Haulage Hoist with 350 H.P. electrical equipment.
1—**Vulcan** Cylindro-conical Shaft Hoist, 400 H.P., 2200 volt complete with safety devices.

And other hoists to suit all mining conditions

Jones Mining Equipment Company

541 Wood Street Pittsburgh, Pa.

READY TO SHIP

AC & DC Motors 1 to 1000 H.P. in stock—

MINING MACHINES

112 AB Goodman Universal 250 v. D.C.
112 G-3 Goodman Universal 220/440 A.C.
112 D-A Goodman Universal 250 v. D.C.
CE-7 Sullivan Shortwall 250 v. 6' bar
CE-7 Sullivan Shortwall A.C. 220/440

MINE LOCOMOTIVES

4½ ton West. 250 v. 36/42" ga.
5 ton Ironton Stor. Battery
6 ton Atlas 220 v. 3 ph. 60 cy.
6 ton West. 904 motors 250 v. 36/42 ga.
10 ton Milwaukee GASOLINE
10 ton G.E. HM-809 250 v. 42" ga.

SUB-STATIONS

1000 kw. West. Syn. 275 v. 22000/13000/4000 or 2300 V.A.C. Rotary
300 kw. Ridway 250 V. 2300/3/60 m.g. syn.
300 kw. Ridg. 250 v. 2300/4000/3/60 Rotary
150 kw. Ridg. 250 v. 2200/3/60 m.g. syn.
150 kw. West. 250 V. 2300/400/3/60 m.g. syn.
100 kw. Ridg. 250 V. 2200/3/60 m.g. syn.
100 kw. West. 250 v. 2200/3/60 m.g. syn.
75 kw. West. 250 v. 2200/3/60 M.G.
45 kw. West. 250 V. 220/440 m.g. syn.

ENGINE GENERATOR SETS

3—Duplicate 219 kva G.E. Gen. 2400/480/240/3/60 dir con. 260 HP. Buckeye DIESEL
75 kw. AC or DC Gen dir con to Van Blerck gas or gasoline engine

TRANSFORMERS

3—333 kva. Pittsburgh 2300-230/115/1/60
3—10 kva. Pgh. 2200-220/110/1/60
2—25 kva. G.E. 2200-220/440/1/60
3—37½ kva. West 22000-2200/1/60
3—50 kva. Packard 2300-115/230v./1/60
3—75 kva. West. 2200-110/220/1/60
1—100 kva. West. 2200-220/110v./1/60

WHEEL PRESS

100 ton horiz mfg by J. T. Shaffer 4 bars

DUQUESNE ELECTRIC & MFG. CO.

Pittsburgh, Pa.

AIR COMPRESSORS:

(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft. (12") Belted, 360, 676, 870, 1000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2600, 5000 ft.
(14) Gasoline, 110, 160, 220, 310 & 370 ft.

COAL CRUSHERS:

Jeffrey Single Roll 18x18, 24x24 & 30x30
Link Belt 26x24 Double Roll Crusher

HYDRAULIC CARWHEEL PRESSES:

100 Ton, 150 Ton, 300 Ton, 300 & 400 Ton Caldwell - Niles - Wood - Watson Stillman

RUBBER CONVEYOR BELTS:

1000' 60", 600' 30", 300' 20", 1600' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14".

CONVEYOR PARTS:

Idlers, Head & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 60 In., Large Stock in Jersey Warehouse.

SYNC. MOTOR GENERATORS:

100 KW Westg. 900 RPM 3/60/2200-250-275
100 KW Ridgway 1200 RPM 3/60/2300/250-275
150 KW G.E. 1200 RPM 3/60/2200-250-275
200 KW Ridgway 900 RPM 3/60/2200-250-275

STORAGE BATTERY LOCOMOTIVES:

2½ ton Whitcomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

TROLLEY LOCOMOTIVES:

2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 Ton Goodman 36 ga.
10 ton Goodman 42 ga.
13 ton Goodman 42 ga.

VIBRATING SCREENS:

9 Tyler Hummer 3x6, 4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½ Symons 4x12 DD.
4x12 Niagara, 3x8 L. B., 5x6 Simplex

SHOVELS, CRANES & DRAGLINES:

9 yd. Bucyrus Moninghan 200 ft. Diesel Walker
1 yd. K 30 Link Belt 50' Boom Crane
1¼ yd. Marion Diesel Shovel
1¼ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
2 yd. Link Belt Elec. Shovel & Dragline
25 ton Browning 50' Boom Loco. Crane
7 Conway 20A, 30A, 50A, 60 & 75 Muckers

MINE LOADERS:

8 BU Joy 36" Caterpillars
Junior Joy 36 ga. Low Pan
136 E-A Goodman 42 ga.
3—5 BU & 7 BU 36 or 42 ga. Joy
9—Goodman 260 & Jeffrey 44L

MISCELLANEOUS:

5'x60' Traylor Rotary Dryer
100 HP G.E. 3/60/440 v.-900 RPM Elec. Motor
6 Goodman 12CA & 12DA 6 ft. Cutters
9x8 Sullivan Mine Compressor
Clamshell Buckets ¾, 1, 1½ & 2 yd. cap.
30 ton & 12 ton Vulcan Std. Ga. Gas. Loco.

WANTED TO BUY:

Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers & Rotary Converters

Tidewater Equip. & Machy. Corp.

60 East 42 St. New York, N. Y.

MG SETS—R. CONVERTERS

300 KW **Ridg.** 225 v. 2300/4000 v. .8 P.F. 1200
300 KW **Westgh.** 550 v. 2300/4000 .8PF 1200 rpm
200 KW **Westgh.** 275 v. 2300/3/60 900 rpm
150 KW **G. E.** 275 v. 2300/3/60 1200 rpm .8 PF
1—150 KW **West.** 600 v. 2200/3/60 900 rpm

LOCO.—MINING MACHINES

10 Ton **G.E.** HM809 F—42" Ga. #4407
6 Ton **Jeffrey** 42/44" Ga. MH 88 #5703
112 DA **Goodman** #6107 250 v. 36" Ga.
12 DA **Goodman** 250 v. 6' cutter bar #3686
212 G3 **Goodman** AC #4391 220/3/60

MISCELLANEOUS

75 HP **Ottumwa** sgl. fric. drum AC Motor.
10 x 10 **Sullivan** Portable Mine Compressor.
2—**Cent.** Bronze pumps 1220 Gal. 220' head—100 HP AC Motors.

Large stock AC and DC Motors, pumps, compressors, Hoists, Conveyors, etc.

MOORHEAD-REITMEYER CO. Inc.

30th & Brereton Sts. Pittsburgh, Pa.

ELECTRIC LOCOMOTIVES

10 ton, Westinghouse, Type 907, 250 volts.
8 ton, Goodman, Type 32A-04-T, 250 volts.
5 ton, Jeffrey, Type MH-87, 250 volts.
4 ton, General Electric, gathering, 250 volts.

MINING MACHINES

2—Jeffrey, 35-B, 250 volts.
1—Jeffrey, 29-B, arcwall, 250 volts.
2—Goodman, Universal, Type 112-DB and 112-DA, 250 volts.
2—Goodman, Standard, Type 12-AA and 12-CA, 250 volts.
1—Goodman, Standard, Type 12-G-3, 220/440 volts, 3 phase, 60 cycle.

SUBSTATION

200 K.W., Ridgway motor generator set, 250 volts D.C., 1200 RPM, direct connected, center pedestal type, synchronous motor, 3 phase, 60 cycle, 2200 volts. With full switchboard equipment, including automatic circuit breaker.

Equipment guaranteed, rebuilt with manufacturers parts.

Also Pumps, Fans, Motors, Hydraulic Wheel Presses; in fact, whatever you need for mine or shop. Complete stock list upon request.

The Industrial Equipment Corp.

Warehouse: Carnegie, Pa.

P.O. Box 1647 Pittsburgh, Pa.

SPECIAL BARGAIN

1—25 ton **G. E. electric locomotive** with 3 HM 824 ball bearing motors.

3—29 LE **Jeffrey**, 250 volt, track mounted **cutting machine.**

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New and Used

Large stocks, all sizes, attractive prices

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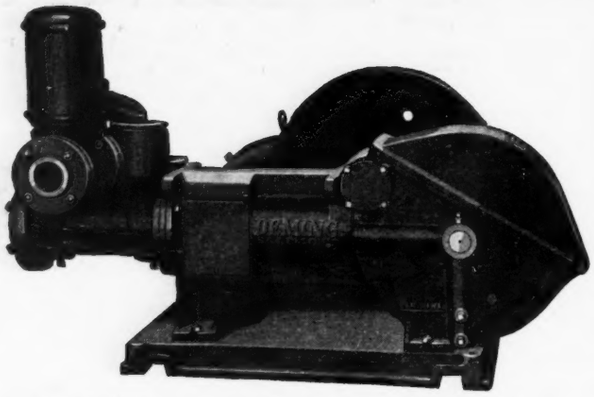
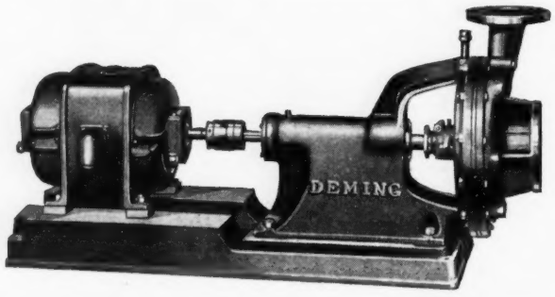


Figure 1896 Type "B" Drive Deming "Oil-Rite" Double-Acting Mine Pump.

Engineered especially for heavy duty mine gathering service. Equipped with Timken Tapered Roller Bearings and Stainless Steel Piston Rod. Available in five capacities ranging from 17.34 to 100 gallons per minute. Adaptable to four types of drive. Write for special Deming Mine Pump Bulletin.



Deming Side-Suction Centrifugal Pump. Double Ball-Bearing Type.

Among the many important advantages of this type of Deming Mine Pump is the separate liquid end construction. This feature makes it possible to use either standard cast iron or special corrosion-resisting alloys in the liquid end, as specified, with the support head of standard cast iron . . . *a money-saving feature for you.* Pump sizes range from 1 to 10 inches with capacities from 10 to 3600 gallons per minute. Write for special Deming Bulletins featuring these pumps.

DEMING

PUMPS AND WATER SYSTEMS

THE DEMING COMPANY • SALEM, OHIO

9 H 9/11

COAL AGE ADVERTISERS

An asterisk preceding manufacturer's name indicates detailed information appears in 1940 *COAL MINING CATALOGS.*

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